APÊNDICE

ANÁLISE EXPLORATÓRIA DE DADOS

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \qquad s = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \left[\left(\sum_{i=1}^{n} x_i\right)^2 / n\right]}{n-1}} \text{ (amostra)} \qquad cv\% = \frac{s}{\bar{x}} \times 100$$

$$\bar{x} = \frac{\sum_{i=1}^{k} x_i \times f_i}{n} \qquad s = \sqrt{\frac{\sum_{i=1}^{k} x_i^2 \times f_i - \left[\left(\sum_{i=1}^{k} x_i \times f_i\right)^2 / n\right]}{n-1}} \text{ (amostra)}$$

$$Pos.Md = \frac{n+1}{2} \qquad Pos.Qi = \frac{n+1}{4} \qquad Pos.Qs = \frac{3 \times (n+1)}{4}$$

$$Q_i - [1{,}5 \times (Q_s - Q_i)] \qquad Q_s + [1{,}5 \times (Q_s - Q_i)]$$

PROBABILIDADES

$$P(E_i) = \frac{n_{E_i}}{n} \qquad P(A \cup B) = P(A) + P(B) - P(A \cap B) \qquad A_{n,k} = \frac{n!}{(n-k)!} \qquad P_n = n!$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)} \qquad P(B/A) = \frac{P(A \cap B)}{P(A)} \qquad C_{n,k} = \frac{n!}{k! \times (n-k)!}$$

$$P(F) = \sum_{i=1}^{n} [P(A_i) \times P(F/A_i)] \qquad P(A_i/F) = \frac{P(A_i) \times P(F/A_i)}{P(F)}$$

Binomial

$$P(X = k) = C_{n,k} \times p^k \times (1-p)^{n-k}$$

$$Média = E(X) = n \times p \qquad Desvio\ padrão = \sigma(X) = \sqrt{n \times p \times (1-p)}$$

Poisson

$$P(X = k) = \frac{e^{-\lambda \times t} \times (\lambda \times t)^k}{k!} = \frac{e^{-m} \times (m)^k}{k!}$$

$$Média = E(X) = \lambda \times t = m \qquad Desvio\ padrão = \sigma(X) = \sqrt{\lambda \times t} = \sqrt{m}$$

Normal

$$P(X \le x_i) = P(Z \le z_i) \qquad z_i = \frac{x_i - \mu}{\sigma}$$

ESTIMAÇÃO DE PARÂMETROS

<table>
<tr><th colspan="2">MÉDIA</th><th>PROPORÇÃO</th></tr>
<tr><td colspan="2">$L_I = \bar{x} - e_0 \qquad L_S = \bar{x} + e_0$</td><td>$L_I = p - e_0 \qquad L_S = p + e_0$</td></tr>
<tr><td colspan="2">$P(L_I \le \mu \le L_S) = 1 - \alpha$</td><td>$P(L_I \le \pi \le L_S) = 1 - \alpha$</td></tr>
<tr><th>σ^2 conhecida</th><th>σ^2 desconhecida</th><td rowspan="2">$e_0 = Z_{crítico} \times \sqrt{\dfrac{p \times (1-p)}{n}}$</td></tr>
<tr><td>$e_0 = \dfrac{Z_{crítico} \times \sigma}{\sqrt{n}}$</td><td>$e_0 = \dfrac{t_{n-1,crítico} \times s}{\sqrt{n}}$</td></tr>
<tr><td>$n = \left(\dfrac{Z_{crítico} \times \sigma}{e_0}\right)^2$</td><td>$n = \left(\dfrac{t_{n-1,crítico} \times s}{e_0}\right)^2$</td><td>$n = \left(\dfrac{Z_{crítico}}{e_0}\right)^2 \times p \times (1-p)$</td></tr>
</table>

ROTEIRO

1) Determinar o parâmetro a ser estimado: média ou proporção populacional.

2) Estabelecer nível de confiança (1-α) ou nível de significância (α).

3) Calcula-se as estatísticas necessárias: $\bar{x}$, p, s.

4) Escolhe-se a variável de teste (Z ou t).

5) Encontra-se $Z_{crítico}$ ou $t_{n-1,crítico}$ nas tabelas apropriadas ou através de aplicativo computacional.

6) Calcular os limites do intervalo de confiança.

7) Interpretar o intervalo de confiança obtido.

TESTES PARAMÉTRICOS

Rejeição de H_0:

HIPÓTESES	MÉDIA		PROPORÇÃO
	σ^2 conhecida	σ^2 desconhecida	
$H_0: \begin{cases} \mu = \mu_0 \\ \pi = \pi_0 \end{cases}$ $H_1: \begin{cases} \mu < \mu_0 \\ \pi < \pi_0 \end{cases}$	$Z_{calculado} = \dfrac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$ Abordagem clássica: $Z_{calculado} < Z_{crítico}$ Abordagem do valor-p $P(Z < Z_{calculado}) < \alpha$	$t_{n-1,calculado} = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ Abordagem clássica: $t_{n-1,calculado} < t_{n-1,crítico}$ Abordagem do valor-p $P(t_{n-1} < t_{n-1,calculado}) < \alpha$	$Z_{calc.} = \dfrac{p - \pi_0}{\sqrt{\dfrac{\pi_0 \times (1-\pi_0)}{n}}}$ Abordagem clássica: $Z_{calculado} < Z_{crítico}$ Abordagem do valor-p $P(Z < Z_{calculado}) < \alpha$
$H_0: \begin{cases} \mu = \mu_0 \\ \pi = \pi_0 \end{cases}$ $H_1: \begin{cases} \mu > \mu_0 \\ \pi > \pi_0 \end{cases}$	Abordagem clássica: $Z_{calculado} > Z_{crítico}$ Abordagem do valor-p $P(Z > Z_{calculado}) < \alpha$	Abordagem clássica: $t_{n-1,calculado} > t_{n-1,crítico}$ Abordagem do valor-p $P(t_{n-1} > t_{n-1,calculado}) < \alpha$	Abordagem clássica: $Z_{calculado} > Z_{crítico}$ Abordagem do valor-p $P(Z > Z_{calculado}) < \alpha$
$H_0: \begin{cases} \mu = \mu_0 \\ \pi = \pi_0 \end{cases}$ $H_1: \begin{cases} \mu \neq \mu_0 \\ \pi \neq \pi_0 \end{cases}$	Abordagem clássica: $\lvert Z_{calculado} \rvert > \lvert Z_{crítico} \rvert$ Abordagem do valor-p $2 \times P(Z > \lvert Z_{calculado} \rvert) < \alpha$	Abordagem clássica: $t_{n-1,calculado} < t_{n-1,crítico}$ Abordagem do valor-p $2 \times P(t_{n-1} > \lvert t_{n-1,calculado} \rvert) < \alpha$	Abordagem clássica: $\lvert Z_{calculado} \rvert > \lvert Z_{crítico} \rvert$ Abordagem do valor-p $2 \times P(Z > \lvert Z_{calculado} \rvert) < \alpha$

ROTEIRO

1) Enunciar as hipóteses H_0 e H_1 (indicando qual o parâmetro de interesse, se o teste é unilateral ou bilateral, etc).

2) Estabelecer o nível de significância (α) ou nível de confiança ($1-\alpha$) do teste.

3) Identificar a variável de teste: Z ou t.

4) Definir a região de aceitação de H_0 (de acordo com o tipo de teste).

5) Através dos valores da amostra avaliar o valor da variável:
   Abordagem clássica: comparar valor da variável de teste com o valor crítico.
   Abordagem do valor-p: obter probabilidade da variável de teste ser maior/menor do que o valor calculado e comparar com α.

6) Decidir pela aceitação ou rejeição de H_0.

7) Interpretar a decisão no contexto do problema.

TESTE DE DIFERENÇA ENTRE 2 PROPORÇÕES: grupos independ.

amostra 1: $\mathbf{n_1, p_1, \pi_1}$ amostra 2: $\mathbf{n_2, p_2, \pi_2}$

1) Enunciar as hipóteses H_0 e H_1:

$H_0: \pi_1 - \pi_2 = \pi_0$ $H_1: \pi_1 - \pi_2 < \pi_0$ ou $\pi_1 - \pi_2 > \pi_0$ ou $\pi_1 - \pi_2 \neq \pi_0$

2) Estabelecer o nível de significância (α) ou nível de confiança (1- α) do teste.

3) Identificar a variável de teste.

4) Definir a região de aceitação de H_0 (de acordo com o tipo de teste).

5) Calcular a variável de teste:

$$Z_{calculado} = \frac{p_1 - p_2 - \pi_0}{\sqrt{\left(\frac{p_1 \times (1 - p_1)}{n_1}\right) + \left(\frac{p_2 \times (1 - p_2)}{n_2}\right)}}$$

7) Decidir pela aceitação ou rejeição de H_0:

Rejeitar H_0:

Hipótese alternativa	Abordagem clássica	Abordagem do valor-p
$H_1: \pi_1 - \pi_2 < \pi_0$	$\mathbf{Z_{calculado} < Z_{crítico}}$	$\mathbf{P(Z < Z_{calculado}) < \alpha}$
$H_1: \pi_1 - \pi_2 > \pi_0$	$\mathbf{Z_{calculado} > Z_{crítico}}$	$\mathbf{P(Z > Z_{calculado}) < \alpha}$
$H_1: \pi_1 - \pi_2 \neq \pi_0$	$\mathbf{\lvert Z_{calculado} \rvert > \lvert Z_{crítico} \rvert}$	$\mathbf{2 \times P(Z > \lvert Z_{calculado} \rvert)}$

8) Interpretar a decisão dentro do contexto do problema.

TESTE DE DIFERENÇA ENTRE MÉDIAS: teste t para 2 amostras pareadas

1)) Enunciar as hipóteses H_0 e H_1:

H_0: $\mu_d = d_0$

H_1: $\mu_d < d_0$ ou $\mu_d > d_0$ ou $\mu_d \neq d_0$

μ_d = diferença entre as médias populacionais = $\mu_{antes} - \mu_{depois}$

2) Estabelecer o nível de significância (α) ou nível de confiança (1- α) do teste.

3) Identificar a variável de teste: $\mathbf{t_{n-1}}$

4) Definir a região de aceitação de H_0, de acordo com o tipo de teste.

5) Através dos valores das amostra antes e depois, calcular a diferença **di** para cada par de valores:

$$d_i = x_{antes\ i} - x_{depois\ i}$$

6) Calcular a diferença média $\bar{d}$: $\bar{d} = \frac{\sum_{i=1}^{n} d_i}{n}$

7) Calcular o desvio padrão da diferença média, $\mathbf{s_d}$: $s_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\left(\sum_{i=1}^{n} d_i\right)^2 / n\right]}{n-1}}$

8) Calcular a variável de teste: $t_{n-1,calculado} = \frac{\bar{d} - d_0}{(s_d/\sqrt{n})}$

9) Decidir pela aceitação ou rejeição de H_0:

Rejeitar H_0:

Hipótese alternativa	Abordagem clássica	Abordagem do valor-p
H_1: $\mu_D < d_0$	$\mathbf{t_{n-1,\ calculado} < t_{n-1,crítico}}$	$\mathbf{P(t_{n-1} < t_{n-1,calculado})}$
H_1: $\mu_D > d_0$	$\mathbf{t_{n-1,\ calculado} > t_{n-1,crítico}}$	$\mathbf{P(t_{n-1} > t_{n-1,calculado})}$
H_1: $\mu_D \neq d_0$	$\mathbf{\lvert t_{n-1,\ calculado}\rvert > \lvert t_{n-1,crítico}\rvert}$	$\mathbf{2 \times P(t_{n-1} > \lvert t_{n-1,calculado}\rvert)}$

10) Interpretar a decisão dentro do contexto do problema.

TESTE DE DIFERENÇA ENTRE MÉDIAS: teste Z e t para 2 amostras independentes

amostra 1: $\mathbf{n_1}$, $\bar{x}_1$, μ_1, s_1^2, σ_1^2 amostra 2: $\mathbf{n_2}$, $\bar{x}_2$, μ_2, s_2^2, σ_2^2

1) Enunciar as hipóteses H_0 e H_1:

H_0: $\mu_1 - \mu_2 = d_0$ H_1: $\mu_1 - \mu_2 < d_0$ ou $\mu_1 - \mu_2 > d_0$ ou $\mu_1 - \mu_2 \neq d_0$

2) Estabelecer o nível de significância (α) ou nível de confiança ($1- \alpha$) do teste.

3) Identificar a variável de teste:

b.1 - σ_1^2 e σ_2^2 conhecidas	b.2 - σ_1^2 e σ_2^2 desconhecidas e supostas iguais	b.3 - σ_1^2 e σ_2^2 desconhecidas e diferentes
Z	$t_{n1+n2-2}$	t_ν $\nu = \left[\dfrac{\left(\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{(n_1+1)}+\frac{\left(\frac{s_2^2}{n_2}\right)^2}{(n_2+1)}}\right]-2$

4) Definir a região de aceitação de H_0, de acordo com o tipo de teste e variável.

5) Calcular o desvio padrão das "diferenças":

b.1	b.2	b.3
$\sigma_d = \sqrt{\dfrac{\sigma_1^2}{n_1}+\dfrac{\sigma_2^2}{n_2}}$	$s_d = \sqrt{\dfrac{[(n_1-1)\times s_1^2+(n_2-1)\times s_2^2]\times\left[\frac{1}{n_1}+\frac{1}{n_2}\right]}{n_1+n_2-2}}$	$s_d = \sqrt{\dfrac{s_1^2}{n_1}+\dfrac{s_2^2}{n_2}}$

6) Calcular a variável de teste:

b.1	b.2	b.3
$Z_{calculado} = \dfrac{(\bar{x}_1-\bar{x}_2)-d_0}{\sigma_d}$	$t_{n_1+n_2-2,calculado} = \dfrac{(\bar{x}_1-\bar{x}_2)-d_0}{s_d}$	$t_{\nu,calculado} = \dfrac{(\bar{x}_1-\bar{x}_2)-d_0}{s_d}$

7) Decidir pela aceitação ou rejeição de H_0:

Hipóteses	b.1 – Rejeição de H_0	b.2 – Rejeição de H_0	b.3 – Rejeição de H_0
H_0: $\mu_1 - \mu_2 = d_0$ H_1: $\mu_1 - \mu_2 < d_0$	Abordagem clássica: Se $Z_{calculado} < Z_{crítico}$ Abordagem do valor-p Se $P(Z < Z_{calculado}) < \alpha$	Abordagem clássica: Se $t_{n1+n2-2,calculado} < t_{n1+n2-2,crítico}$ Abordagem do valor-p Se $P(t_{n1+n2-2} < t_{n1+n2-2,calculado}) < \alpha$	Abordagem clássica: Se $t_{\nu, calculado} < t_{\nu,crítico}$ Abordagem do valor-p Se $P(t_\nu < t_{\nu, calculado}) < \alpha$
H_0: $\mu_1 - \mu_2 = d_0$ H_1: $\mu_1 - \mu_2 > d_0$	Abordagem clássica: Se $Z_{calculado} > Z_{crítico}$ Abordagem do valor-p Se $P(Z > Z_{calculado}) < \alpha$	Abordagem clássica: Se $t_{n1+n2-2,calculado} > t_{n1+n2-2,crítico}$ Abordagem do valor-p Se $P(t_{n1+n2-2} > t_{n1+n2-2,calculado}) < \alpha$	Abordagem clássica: Se $t_{\nu, calculado} > t_{\nu,crítico}$ Abordagem do valor-p Se $P(t_\nu > t_{\nu, calculado}) < \alpha$
H_0: $\mu_1 - \mu_2 = d_0$ H_1: $\mu_1 - \mu_2 \neq d_0$	Abordagem clássica: Se $\lvert Z_{calculado}\rvert > \lvert Z_{crítico}\rvert$ Abordagem do valor-p Se $2\times P(Z>\lvert Z_{calculado}\rvert) < \alpha$	Abordagem clássica: Se $\lvert t_{n1+n2-2,calculado}\rvert < \lvert t_{n1+n2-2,crítico}\rvert$ Abordagem do valor-p Se $2\times P(t_{n1+n2-2}>\lvert t_{n1+n2-2,calculado}\rvert) < \alpha$	Abordagem clássica: Se $\lvert t_{\nu, calculado}\rvert > \lvert t_{\nu,crítico}\rvert$ Abordagem do valor-p Se $2\times P(t_\nu>\lvert t_{\nu, calculado}\rvert)< \alpha$

8) Interpretar a decisão dentro do contexto do problema.

TESTE DE DIFERENÇA ENTRE VARIÂNCIAS (TESTE F)

amostra 1: $\mathbf{n_1}$, $\mathbf{\bar{x}_1}$, $\mathbf{\mu_1}$, $\mathbf{s_1^2}$, $\mathbf{\sigma_1^2}$ amostra 2: $\mathbf{n_2}$, $\mathbf{\bar{x}_2}$, $\mathbf{\mu_2}$, $\mathbf{s_2^2}$, $\mathbf{\sigma_2^2}$

1) Enunciar as hipóteses H_0 e H_1:

H_0: $\boldsymbol{\sigma_1^2 = \sigma_2^2}$

Teste Bilateral

H_1: $\boldsymbol{\sigma_1^2 \neq \sigma_2^2}$

2) Estabelecer o nível de significância (α) do teste

2) Determinar a razão **F** (com $\mathbf{n_1}$**-1** e $\mathbf{n_2}$**-1** graus de liberdade):

$$F_{n_1-1,n_2-1} = \frac{s_1^2}{s_2^2}$$

3) Encontrar os valores críticos de F:

$$F_{n_1-1,n_2-1;\alpha/2} \qquad F_{n_1-1,n_2-1;1-\alpha/2}$$

5) Se $F_{n_1-1,n_2-1} < F_{n_1-1,n_2-1;\alpha/2}$ OU $F_{n_1-1,n_2-1} > F_{n_1-1,n_2-1;1-\alpha/2}$ => **Rejeitar** H_0

TESTE DO CHI-QUADRADO - $\chi 2$ (INDEPENDÊNCIA)

1) Formular as hipóteses H_0 e H_1:

H_0: as populações não diferem em relação às freqüências com que ocorre uma característica particular- as variáveis são independentes.

H_1: as diferenças amostrais entre as freqüências refletem diferenças reais das populações -as variáveis não são independentes.

2) Estabelecer o nível de significância (α) ou nível de confiança (1- α) do teste.

3) Retirar as amostras aleatórias e tabular os dados nominais com as freqüências observadas (Oij):

	Variável 1						
Variável2	1	2	...	j	...	n	Total
1	O_{11}	O_{12}	...	O_{1j}	...	O_{1n}	L_1
2	O_{21}	O_{22}	...	O_{2j}	...	O_{2n}	L_2
...	...	....	...	...	...	...	...
i	O_{i1}	O_{i2}	...	O_{ij}	...	O_{in}	L_i
...	...	...	...	...	...	...	...
m	O_{m1}	O_{m2}	...	O_{mj}	...	O_{mn}	L_m
Total	C_1	C_2	...	C_j	...	C_n	N

$\mathbf{L_i = \sum_{j=1}^{n} O_{ij}}$: Total marginal da linha i. $\mathbf{C_j = \sum_{i=1}^{m} O_{ij}}$: Total marginal da coluna j.

$\mathbf{N = \sum_{i=1}^{m} \sum_{j=1}^{n} O_{ij}}$: Total geral de observações.

4) Calcular as freqüências esperadas (E_{ij}):

$E_{ij} = \frac{L_i \times C_j}{N}$ para i de 1 a m, e j de 1 a n.

Se qualquer $E_{ij} < 5$ é aconselhável não aplicar o teste, sem antes agrupar uma ou mais células, até obter todas $E_{ij} \geq 5$.

5) Calcular a estatística $\chi 2$ para o teste:

$\chi^2_{(l-1)\times(c-1),calculado} = \sum \left[\frac{(O_{ij}-E_{ij})^2}{E_{ij}}\right]$ **l** : número de linhas (m) **c** : número de colunas (n)

6) Determinar o χ^2 crítico: $\chi^2_{(l-1)\times(c-1),crítico}$

7) Decidir pela aceitação ou rejeição de H_0:

Abordagem clássica:

Se $\chi^2_{(l-1)\times(c-1),calculado} > \chi^2_{(l-1)\times(c-1),crítico}$ rejeitar H_0.

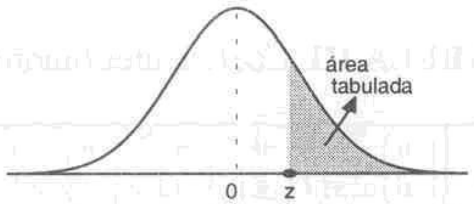
Abordagem do valor-p:

Se $P\left(\chi^2_{(l-1)\times(c-1)}\right) > \chi^2_{(l-1)\times(c-1),calculado}\Big) < \alpha$ rejeitar H_0.

8) Interpretar a decisão dentro do contexto do problema.

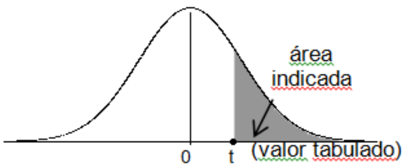
DISTRIBUIÇÃO NORMAL PADRÃO

TABELA IV Distribuição normal padrão.



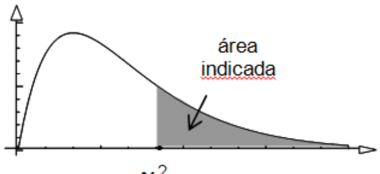
z	segunda decimal de z									
	0,00	0,01	0,02	0,03	0,04	0,05	0,06	0,07	0,08	0,09
0,0	0,5000	0,4960	0,4920	0,4880	0,4840	0,4801	0,4761	0,4721	0,4681	0,4641
0,1	0,4602	0,4562	0,4522	0,4483	0,4443	0,4404	0,4364	0,4325	0,4286	0,4247
0,2	0,4207	0,4168	0,4129	0,4090	0,4052	0,4013	0,3974	0,3936	0,3897	0,3859
0,3	0,3821	0,3783	0,3745	0,3707	0,3669	0,3632	0,3594	0,3557	0,3520	0,3483
0,4	0,3446	0,3409	0,3372	0,3336	0,3300	0,3264	0,3228	0,3192	0,3156	0,3121
0,5	0,3085	0 ,3050	0 ,3015	0 ,2981	0 ,2946	0 ,2912	0 ,2877	0 ,2842	0 ,2810	0 ,2776
0,6	0,2743	0 ,2709	0 ,2676	0 ,2643	0 ,2611	0 ,2578	0 ,2546	0 ,2514	0 ,2483	0 ,2451
0,7	0,2420	0 ,2389	0 ,2358	0 ,2327	0 ,2296	0 ,2266	0 ,2236	0 ,2206	0 ,2177	0 ,2148
0,8	0,2119	0 ,2090	0 ,2061	0 ,2033	0 ,2005	0 ,1977	0 ,1949	0 ,1922	0 ,1894	0 ,1867
0,9	0,1841	0 ,1814	0 ,1788	0 ,1762	0 ,1736	0 ,1711	0 ,1685	0 ,1660	0 ,1635	0 ,1611
1,0	0,1587	0 ,1562	0 ,1539	0 ,1515	0 ,1492	0 ,1469	0 ,1446	0 ,1423	0 ,1401	0 ,1379
1,1	0,1357	0 ,1335	0 ,1314	0 ,1292	0 ,1271	0 ,1251	0 ,1230	0 ,1210	0 ,1190	0 ,1170
1,2	0 ,1151	0 ,1131	0 ,1112	0 ,1093	0 ,1075	0 ,1056	0 ,1038	0 ,1020	0 ,1003	0 ,0985
1,3	0 ,0968	0 ,0951	0 ,0934	0 ,0918	0 ,0901	0 ,0885	0 ,0869	0 ,0853	0 ,0838	0 ,0823
1,4	0 ,0808	0 ,0793	0 ,0778	0 ,0764	0 ,0749	0 ,0735	0 ,0722	0 ,0708	0 ,0694	0 ,0681
1,5	0 ,0668	0 ,0655	0 ,0643	0 ,0630	0 ,0618	0 ,0606	0 ,0594	0 ,0582	0 ,0571	0 ,0559
1,6	0 ,0548	0 ,0537	0 ,0526	0 ,0516	0 ,0505	0 ,0495	0 ,0485	0 ,0475	0 ,0465	0 ,0455
1,7	0 ,0446	0 ,0436	0 ,0427	0 ,0418	0 ,0409	0 ,0401	0 ,0392	0 ,0384	0 ,0375	0 ,0367
1,8	0 ,0359	0 ,0352	0 ,0344	0 ,0336	0 ,0329	0 ,0322	0 ,0314	0 ,0307	0 ,0301	0 ,0294
1,9	0 ,0287	0 ,0281	0 ,0274	0 ,0268	0 ,0262	0 ,0256	0 ,0250	0 ,0244	0 ,0239	0 ,0233
2,0	0 ,0228	0 ,0222	0 ,0217	0 ,0212	0 ,0207	0 ,0202	0 ,0197	0 ,0192	0 ,0188	0 ,0183
2,1	0 ,0179	0 ,0174	0 ,0170	0 ,0166	0 ,0162	0 ,0158	0 ,0154	0 ,0150	0 ,0146	0 ,0143
2,2	0 ,0139	0 ,0136	0 ,0132	0 ,0129	0 ,0125	0 ,0122	0 ,0119	0 ,0116	0 ,0113	0 ,0110
2,3	0 ,0107	0 ,0104	0 ,0102	0 ,0099	0 ,0096	0 ,0094	0 ,0091	0 ,0089	0 ,0087	0 ,0084
2,4	0 ,0082	0 ,0080	0 ,0078	0 ,0075	0 ,0073	0 ,0071	0 ,0069	0 ,0068	0 ,0066	0 ,0064
2,5	0 ,0062	0 ,0060	0 ,0059	0 ,0057	0 ,0055	0 ,0054	0 ,0052	0 ,0051	0 ,0049	0 ,0048
2,6	0 ,0047	0 ,0045	0 ,0044	0 ,0043	0 ,0041	0 ,0040	0 ,0039	0 ,0038	0 ,0037	0 ,0036
2,7	0 ,0035	0 ,0034	0 ,0033	0 ,0032	0 ,0031	0 ,0030	0 ,0029	0 ,0028	0 ,0027	0 ,0026
2,8	0 ,0026	0 ,0025	0 ,0024	0 ,0023	0 ,0023	0 ,0022	0 ,0021	0 ,0021	0 ,0020	0 ,0019
2,9	0 ,0019	0 ,0018	0 ,0017	0 ,0017	0 ,0016	0 ,0016	0 ,0015	0 ,0015	0 ,0014	0 ,0014
3,0	0,00135									
3,5	0,000 233									
4,0	0,000 031 7									
4,5	0,000 003 40									
5,0	0,000 000 287									

DISTRIBUIÇÃO t DE STUDENT



			Área na cauda superior													
gl	0,3	0,25	0,1	0,05	0,04	0,03	0,025	0,02	0,01	0,005	0,003	0,0025	0,001	0,0005	0,0001	0,00001
1	0,727	1,000	3,078	6,314	7,916	10,579	12,706	15,895	31,821	63,657	106,100	127,321	318,309	636,619	3183,099	31830,989
2	0,617	0,816	1,886	2,920	3,320	3,896	4,303	4,849	6,965	9,925	12,852	14,089	22,327	31,599	70,700	223,603
3	0,584	0,765	1,638	2,353	2,605	2,951	3,182	3,482	4,541	5,841	6,994	7,453	10,215	12,924	22,204	47,928
4	0,569	0,741	1,533	2,132	2,333	2,601	2,776	2,999	3,747	4,604	5,321	5,598	7,173	8,610	13,034	23,332
5	0,559	0,727	1,476	2,015	2,191	2,422	2,571	2,757	3,365	4,032	4,570	4,773	5,893	6,869	9,678	15,547
6	0,553	0,718	1,440	1,943	2,104	2,313	2,447	2,612	3,143	3,707	4,152	4,317	5,208	5,959	8,025	12,032
7	0,549	0,711	1,415	1,895	2,046	2,241	2,365	2,517	2,998	3,499	3,887	4,029	4,785	5,408	7,063	10,103
8	0,546	0,706	1,397	1,860	2,004	2,189	2,306	2,449	2,896	3,355	3,705	3,833	4,501	5,041	6,442	8,907
9	0,543	0,703	1,383	1,833	1,973	2,150	2,262	2,398	2,821	3,250	3,573	3,690	4,297	4,781	6,010	8,102
10	0,542	0,700	1,372	1,812	1,948	2,120	2,228	2,359	2,764	3,169	3,472	3,581	4,144	4,587	5,694	7,527
11	0,540	0,697	1,363	1,796	1,928	2,096	2,201	2,328	2,718	3,106	3,393	3,497	4,025	4,437	5,453	7,097
12	0,539	0,695	1,356	1,782	1,912	2,076	2,179	2,303	2,681	3,055	3,330	3,428	3,930	4,318	5,263	6,765
13	0,538	0,694	1,350	1,771	1,899	2,060	2,160	2,282	2,650	3,012	3,278	3,372	3,852	4,221	5,111	6,501
14	0,537	0,692	1,345	1,761	1,887	2,046	2,145	2,264	2,624	2,977	3,234	3,326	3,787	4,140	4,985	6,287
15	0,536	0,691	1,341	1,753	1,878	2,034	2,131	2,249	2,602	2,947	3,197	3,286	3,733	4,073	4,880	6,109
16	0,535	0,690	1,337	1,746	1,869	2,024	2,120	2,235	2,583	2,921	3,165	3,252	3,686	4,015	4,791	5,959
17	0,534	0,689	1,333	1,740	1,862	2,015	2,110	2,224	2,567	2,898	3,138	3,222	3,646	3,965	4,714	5,832
18	0,534	0,688	1,330	1,734	1,855	2,007	2,101	2,214	2,552	2,878	3,113	3,197	3,610	3,922	4,648	5,722
19	0,533	0,688	1,328	1,729	1,850	2,000	2,093	2,205	2,539	2,861	3,092	3,174	3,579	3,883	4,590	5,627
20	0,533	0,687	1,325	1,725	1,844	1,994	2,086	2,197	2,528	2,845	3,073	3,153	3,552	3,850	4,539	5,543
21	0,532	0,686	1,323	1,721	1,840	1,988	2,080	2,189	2,518	2,831	3,056	3,135	3,527	3,819	4,493	5,469
22	0,532	0,686	1,321	1,717	1,835	1,983	2,074	2,183	2,508	2,819	3,041	3,119	3,505	3,792	4,452	5,402
23	0,532	0,685	1,319	1,714	1,832	1,978	2,069	2,177	2,500	2,807	3,027	3,104	3,485	3,768	4,415	5,343
24	0,531	0,685	1,318	1,711	1,828	1,974	2,064	2,172	2,492	2,797	3,014	3,091	3,467	3,745	4,382	5,290
25	0,531	0,684	1,316	1,708	1,825	1,970	2,060	2,167	2,485	2,787	3,003	3,078	3,450	3,725	4,352	5,241
26	0,531	0,684	1,315	1,706	1,822	1,967	2,056	2,162	2,479	2,779	2,992	3,067	3,435	3,707	4,324	5,197
27	0,531	0,684	1,314	1,703	1,819	1,963	2,052	2,158	2,473	2,771	2,982	3,057	3,421	3,690	4,299	5,157
28	0,530	0,683	1,313	1,701	1,817	1,960	2,048	2,154	2,467	2,763	2,973	3,047	3,408	3,674	4,275	5,120
29	0,530	0,683	1,311	1,699	1,814	1,957	2,045	2,150	2,462	2,756	2,965	3,038	3,396	3,659	4,254	5,086
30	0,530	0,683	1,310	1,697	1,812	1,955	2,042	2,147	2,457	2,750	2,957	3,030	3,385	3,646	4,234	5,054
31	0,530	0,682	1,309	1,696	1,810	1,952	2,040	2,144	2,453	2,744	2,950	3,022	3,375	3,633	4,216	5,025
32	0,530	0,682	1,309	1,694	1,808	1,950	2,037	2,141	2,449	2,738	2,943	3,015	3,365	3,622	4,198	4,998
33	0,530	0,682	1,308	1,692	1,806	1,948	2,035	2,138	2,445	2,733	2,937	3,008	3,356	3,611	4,182	4,973
34	0,529	0,682	1,307	1,691	1,805	1,946	2,032	2,136	2,441	2,728	2,931	3,002	3,348	3,601	4,167	4,949
35	0,529	0,682	1,306	1,690	1,803	1,944	2,030	2,133	2,438	2,724	2,926	2,996	3,340	3,591	4,153	4,927
36	0,529	0,681	1,306	1,688	1,802	1,942	2,028	2,131	2,434	2,719	2,920	2,990	3,333	3,582	4,140	4,906
37	0,529	0,681	1,305	1,687	1,800	1,940	2,026	2,129	2,431	2,715	2,915	2,985	3,326	3,574	4,127	4,887
38	0,529	0,681	1,304	1,686	1,799	1,939	2,024	2,127	2,429	2,712	2,911	2,980	3,319	3,566	4,116	4,869
39	0,529	0,681	1,304	1,685	1,798	1,937	2,023	2,125	2,426	2,708	2,906	2,976	3,313	3,558	4,105	4,851
40	0,529	0,681	1,303	1,684	1,796	1,936	2,021	2,123	2,423	2,704	2,902	2,971	3,307	3,551	4,094	4,835
41	0,529	0,681	1,303	1,683	1,795	1,934	2,020	2,121	2,421	2,701	2,898	2,967	3,301	3,544	4,084	4,820
42	0,528	0,680	1,302	1,682	1,794	1,933	2,018	2,120	2,418	2,698	2,895	2,963	3,296	3,538	4,075	4,805
43	0,528	0,680	1,302	1,681	1,793	1,932	2,017	2,118	2,416	2,695	2,891	2,959	3,291	3,532	4,066	4,791
44	0,528	0,680	1,301	1,680	1,792	1,931	2,015	2,116	2,414	2,692	2,888	2,956	3,286	3,526	4,057	4,778
45	0,528	0,680	1,301	1,679	1,791	1,929	2,014	2,115	2,412	2,690	2,884	2,952	3,281	3,520	4,049	4,765
46	0,528	0,680	1,300	1,679	1,790	1,928	2,013	2,114	2,410	2,687	2,881	2,949	3,277	3,515	4,042	4,754
47	0,528	0,680	1,300	1,678	1,789	1,927	2,012	2,112	2,408	2,685	2,878	2,946	3,273	3,510	4,034	4,742
48	0,528	0,680	1,299	1,677	1,789	1,926	2,011	2,111	2,407	2,682	2,875	2,943	3,269	3,505	4,027	4,731
49	0,528	0,680	1,299	1,677	1,788	1,925	2,010	2,110	2,405	2,680	2,873	2,940	3,265	3,500	4,020	4,721
50	0,528	0,679	1,299	1,676	1,787	1,924	2,009	2,109	2,403	2,678	2,870	2,937	3,261	3,496	4,014	4,711
Z	0,524	0,674	1,282	1,645	1,751	1,881	1,960	2,054	2,326	2,576	2,748	2,807	3,090	3,291	3,719	4,265

DISTRIBUIÇÃO CHI-QUADRADO



			Área na cauda superior													
gl	0,3	0,25	0,1	0,05	0,04	0,03	0,025	0,02	0,01	0,005	0,003	0,0025	0,001	0,0005	0,0001	0,00001
1	1,074	1,323	2,706	3,841	4,218	4,709	5,024	5,412	6,635	7,879	8,807	9,141	10,828	12,116	15,137	19,511
2	2,408	2,773	4,605	5,991	6,438	7,013	7,378	7,824	9,210	10,597	11,618	11,983	13,816	15,202	18,421	23,026
3	3,665	4,108	6,251	7,815	8,311	8,947	9,348	9,837	11,345	12,838	13,931	14,320	16,266	17,730	21,108	25,902
4	4,878	5,385	7,779	9,488	10,026	10,712	11,143	11,668	13,277	14,860	16,014	16,424	18,467	19,997	23,513	28,473
5	6,064	6,626	9,236	11,070	11,644	12,375	12,833	13,388	15,086	16,750	17,958	18,386	20,515	22,105	25,745	30,856
6	7,231	7,841	10,645	12,592	13,198	13,968	14,449	15,033	16,812	18,548	19,805	20,249	22,458	24,103	27,856	33,107
7	8,383	9,037	12,017	14,067	14,703	15,509	16,013	16,622	18,475	20,278	21,580	22,040	24,322	26,018	29,878	35,259
8	9,524	10,219	13,362	15,507	16,171	17,010	17,535	18,168	20,090	21,955	23,300	23,774	26,124	27,868	31,828	37,332
9	10,656	11,389	14,684	16,919	17,608	18,480	19,023	19,679	21,666	23,589	24,974	25,462	27,877	29,666	33,720	39,341
10	11,781	12,549	15,987	18,307	19,021	19,922	20,483	21,161	23,209	25,188	26,611	27,112	29,588	31,420	35,564	41,296
11	12,899	13,701	17,275	19,675	20,412	21,342	21,920	22,618	24,725	26,757	28,216	28,729	31,264	33,137	37,367	43,206
12	14,011	14,845	18,549	21,026	21,785	22,742	23,337	24,054	26,217	28,300	29,793	30,318	32,909	34,821	39,134	45,076
13	15,119	15,984	19,812	22,362	23,142	24,125	24,736	25,472	27,688	29,819	31,346	31,883	34,528	36,478	40,871	46,912
14	16,222	17,117	21,064	23,685	24,485	25,493	26,119	26,873	29,141	31,319	32,878	33,426	36,123	38,109	42,579	48,716
15	17,322	18,245	22,307	24,996	25,816	26,848	27,488	28,259	30,578	32,801	34,391	34,950	37,697	39,719	44,263	50,493
16	18,418	19,369	23,542	26,296	27,136	28,191	28,845	29,633	32,000	34,267	35,887	36,456	39,252	41,308	45,925	52,245
17	19,511	20,489	24,769	27,587	28,445	29,523	30,191	30,995	33,409	35,718	37,367	37,946	40,790	42,879	47,566	53,974
18	20,601	21,605	25,989	28,869	29,745	30,845	31,526	32,346	34,805	37,156	38,833	39,422	42,312	44,434	49,189	55,683
19	21,689	22,718	27,204	30,144	31,037	32,158	32,852	33,687	36,191	38,582	40,287	40,885	43,820	45,973	50,795	57,373
20	22,775	23,828	28,412	31,410	32,321	33,462	34,170	35,020	37,566	39,997	41,728	42,336	45,315	47,498	52,386	59,045
21	23,858	24,935	29,615	32,671	33,597	34,759	35,479	36,343	38,932	41,401	43,159	43,775	46,797	49,011	53,962	60,700
22	24,939	26,039	30,813	33,924	34,867	36,049	36,781	37,659	40,289	42,796	44,579	45,204	48,268	50,511	55,525	62,341
23	26,018	27,141	32,007	35,172	36,131	37,332	38,076	38,968	41,638	44,181	45,990	46,623	49,728	52,000	57,075	63,968
24	27,096	28,241	33,196	36,415	37,389	38,609	39,364	40,270	42,980	45,559	47,391	48,034	51,179	53,479	58,613	65,581
25	28,172	29,339	34,382	37,652	38,642	39,880	40,646	41,566	44,314	46,928	48,785	49,435	52,620	54,947	60,140	67,182
26	29,246	30,435	35,563	38,885	39,889	41,146	41,923	42,856	45,642	48,290	50,171	50,829	54,052	56,407	61,657	68,771
27	30,319	31,528	36,741	40,113	41,132	42,407	43,195	44,140	46,963	49,645	51,549	52,215	55,476	57,858	63,164	70,349
28	31,391	32,620	37,916	41,337	42,370	43,662	44,461	45,419	48,278	50,993	52,920	53,594	56,892	59,300	64,662	71,917
29	32,461	33,711	39,087	42,557	43,604	44,913	45,722	46,693	49,588	52,336	54,285	54,967	58,301	60,735	66,152	73,475
30	33,530	34,800	40,256	43,773	44,834	46,160	46,979	47,962	50,892	53,672	55,643	56,332	59,703	62,162	67,633	75,023
35	38,859	40,223	46,059	49,802	50,928	52,335	53,203	54,244	57,342	60,275	62,351	63,076	66,619	69,199	74,926	82,640
40	44,165	45,616	51,805	55,758	56,946	58,428	59,342	60,436	63,691	66,766	68,940	69,699	73,402	76,095	82,062	90,079
45	49,452	50,985	57,505	61,656	62,901	64,453	65,410	66,555	69,957	73,166	75,432	76,223	80,077	82,876	89,070	97,372
50	54,723	56,334	63,167	67,505	68,804	70,423	71,420	72,613	76,154	79,490	81,843	82,664	86,661	89,561	95,969	104,542
100	106,906	109,141	118,498	124,342	126,079	128,237	129,561	131,142	135,807	140,169	143,229	144,293	149,449	153,167	161,319	172,099

DISTRIBUIÇÃO F (α = 0,05) – Valores de $F_{gl1,gl2;0,025}$ e $F_{gl1;gl2;0,975}$

	den																																																	
num	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25
1	0,002	647,789	0,001	38,506	0,001	17,443	0,001	12,218	0,001	10,007	0,001	8,813	0,001	8,073	0,001	7,571	0,001	7,209	0,001	6,937	0,001	6,724	0,001	6,554	0,001	6,414	0,001	6,298	0,001	6,200	0,001	6,115	0,001	6,042	0,001	5,978	0,001	5,922	0,001	5,871	0,001	5,827	0,001	5,786	0,001	5,750	0,001	5,717	0,001	5,686
2	0,026	799,500	0,026	39,000	0,026	16,044	0,025	10,649	0,025	8,434	0,025	7,260	0,025	6,542	0,025	6,059	0,025	5,715	0,025	5,456	0,025	5,256	0,025	5,096	0,025	4,965	0,025	4,857	0,025	4,765	0,025	4,687	0,025	4,619	0,025	4,560	0,025	4,508	0,025	4,461	0,025	4,420	0,025	4,383	0,025	4,349	0,025	4,319	0,025	4,291
3	0,057	864,163	0,062	39,165	0,065	15,439	0,066	9,979	0,067	7,764	0,068	6,599	0,068	5,890	0,069	5,416	0,069	5,078	0,069	4,826	0,070	4,630	0,070	4,474	0,070	4,347	0,070	4,242	0,070	4,153	0,070	4,077	0,070	4,011	0,070	3,954	0,071	3,903	0,071	3,859	0,071	3,819	0,071	3,783	0,071	3,750	0,071	3,721	0,071	3,694
4	0,082	899,583	0,094	39,248	0,100	15,101	0,104	9,605	0,107	7,388	0,109	6,227	0,110	5,523	0,111	5,053	0,112	4,718	0,113	4,468	0,114	4,275	0,114	4,121	0,115	3,996	0,115	3,892	0,116	3,804	0,116	3,729	0,116	3,665	0,116	3,608	0,117	3,559	0,117	3,515	0,117	3,475	0,117	3,440	0,117	3,408	0,117	3,379	0,118	3,353
5	0,100	921,848	0,119	39,298	0,129	14,885	0,135	9,364	0,140	7,146	0,143	5,988	0,146	5,285	0,148	4,817	0,150	4,484	0,151	4,236	0,152	4,044	0,153	3,891	0,154	3,767	0,155	3,663	0,156	3,576	0,156	3,502	0,157	3,438	0,157	3,382	0,158	3,333	0,158	3,289	0,158	3,250	0,159	3,215	0,159	3,183	0,159	3,155	0,160	3,129
6	0,113	937,111	0,138	39,331	0,152	14,735	0,161	9,197	0,167	6,978	0,172	5,820	0,176	5,119	0,179	4,652	0,181	4,320	0,183	4,072	0,185	3,881	0,186	3,728	0,188	3,604	0,189	3,501	0,190	3,415	0,191	3,341	0,192	3,277	0,192	3,221	0,193	3,172	0,193	3,128	0,194	3,090	0,195	3,055	0,195	3,023	0,195	2,995	0,196	2,969
7	0,124	948,217	0,153	39,355	0,170	14,624	0,181	9,074	0,189	6,853	0,195	5,695	0,200	4,995	0,204	4,529	0,207	4,197	0,210	3,950	0,212	3,759	0,214	3,607	0,216	3,483	0,218	3,380	0,219	3,293	0,220	3,219	0,221	3,156	0,222	3,100	0,223	3,051	0,224	3,007	0,225	2,969	0,225	2,934	0,226	2,902	0,227	2,874	0,227	2,848
8	0,132	956,656	0,165	39,373	0,185	14,540	0,198	8,980	0,208	6,757	0,215	5,600	0,221	4,899	0,226	4,433	0,230	4,102	0,233	3,855	0,236	3,664	0,238	3,512	0,240	3,388	0,242	3,285	0,244	3,199	0,245	3,125	0,247	3,061	0,248	3,005	0,249	2,956	0,250	2,913	0,251	2,874	0,252	2,839	0,253	2,808	0,253	2,779	0,254	2,753
9	0,139	963,285	0,175	39,387	0,197	14,473	0,212	8,905	0,223	6,681	0,231	5,523	0,238	4,823	0,244	4,357	0,248	4,026	0,252	3,779	0,256	3,588	0,259	3,436	0,261	3,312	0,263	3,209	0,265	3,123	0,267	3,049	0,269	2,985	0,270	2,929	0,271	2,880	0,273	2,837	0,274	2,798	0,275	2,763	0,276	2,731	0,277	2,703	0,278	2,677
10	0,144	968,627	0,183	39,398	0,207	14,419	0,224	8,844	0,236	6,619	0,246	5,461	0,253	4,761	0,259	4,295	0,265	3,964	0,269	3,717	0,273	3,526	0,276	3,374	0,279	3,250	0,282	3,147	0,284	3,060	0,286	2,986	0,288	2,922	0,290	2,866	0,291	2,817	0,293	2,774	0,294	2,735	0,295	2,700	0,296	2,668	0,297	2,640	0,298	2,613
11	0,149	973,025	0,190	39,407	0,216	14,374	0,234	8,794	0,247	6,568	0,258	5,410	0,266	4,709	0,273	4,243	0,279	3,912	0,284	3,665	0,288	3,474	0,292	3,321	0,295	3,197	0,298	3,095	0,300	3,008	0,303	2,934	0,305	2,870	0,307	2,814	0,308	2,765	0,310	2,721	0,311	2,682	0,313	2,647	0,314	2,615	0,315	2,586	0,316	2,560
12	0,153	976,708	0,196	39,415	0,224	14,337	0,243	8,751	0,257	6,525	0,268	5,366	0,277	4,666	0,285	4,200	0,291	3,868	0,296	3,621	0,301	3,430	0,305	3,277	0,309	3,153	0,312	3,050	0,315	2,963	0,317	2,889	0,320	2,825	0,322	2,769	0,324	2,720	0,325	2,676	0,327	2,637	0,329	2,602	0,330	2,570	0,331	2,541	0,332	2,515
13	0,156	979,837	0,201	39,421	0,230	14,304	0,250	8,715	0,265	6,488	0,277	5,329	0,287	4,628	0,295	4,162	0,302	3,831	0,308	3,583	0,313	3,392	0,317	3,239	0,321	3,115	0,324	3,012	0,328	2,925	0,330	2,851	0,333	2,786	0,335	2,730	0,337	2,681	0,339	2,637	0,341	2,598	0,343	2,563	0,344	2,531	0,346	2,502	0,347	2,476
14	0,159	982,528	0,206	39,427	0,236	14,277	0,257	8,684	0,273	6,456	0,286	5,297	0,296	4,596	0,304	4,130	0,312	3,798	0,318	3,550	0,323	3,359	0,328	3,206	0,332	3,082	0,336	2,979	0,339	2,891	0,342	2,817	0,345	2,753	0,347	2,696	0,350	2,647	0,352	2,603	0,354	2,564	0,355	2,528	0,357	2,497	0,359	2,468	0,360	2,441
15	0,161	984,867	0,210	39,431	0,241	14,253	0,263	8,657	0,280	6,428	0,293	5,269	0,304	4,568	0,313	4,101	0,320	3,769	0,327	3,522	0,332	3,330	0,337	3,177	0,342	3,053	0,346	2,949	0,349	2,862	0,353	2,788	0,356	2,723	0,358	2,667	0,361	2,617	0,363	2,573	0,365	2,534	0,367	2,498	0,369	2,466	0,370	2,437	0,372	2,411
16	0,164	986,919	0,213	39,435	0,245	14,232	0,268	8,633	0,286	6,403	0,299	5,244	0,311	4,543	0,320	4,076	0,328	3,744	0,335	3,496	0,341	3,304	0,346	3,152	0,351	3,027	0,355	2,923	0,359	2,836	0,362	2,761	0,365	2,697	0,368	2,640	0,371	2,591	0,373	2,547	0,375	2,507	0,377	2,472	0,379	2,440	0,381	2,411	0,383	2,384
17	0,166	988,733	0,217	39,439	0,249	14,213	0,273	8,611	0,291	6,381	0,305	5,222	0,317	4,521	0,327	4,054	0,335	3,722	0,342	3,474	0,348	3,282	0,354	3,129	0,359	3,004	0,363	2,900	0,367	2,813	0,371	2,738	0,374	2,673	0,377	2,617	0,380	2,567	0,382	2,523	0,385	2,483	0,387	2,448	0,389	2,416	0,391	2,386	0,392	2,360
18	0,167	990,349	0,219	39,442	0,253	14,196	0,277	8,592	0,296	6,362	0,310	5,202	0,323	4,501	0,333	4,034	0,341	3,701	0,349	3,453	0,355	3,261	0,361	3,108	0,366	2,983	0,371	2,879	0,375	2,792	0,379	2,717	0,382	2,652	0,385	2,596	0,388	2,546	0,391	2,501	0,393	2,462	0,395	2,426	0,398	2,394	0,400	2,365	0,401	2,338
19	0,169	991,797	0,222	39,445	0,256	14,181	0,281	8,575	0,300	6,344	0,315	5,184	0,328	4,483	0,338	4,016	0,347	3,683	0,355	3,435	0,362	3,243	0,368	3,090	0,373	2,965	0,378	2,861	0,382	2,773	0,386	2,698	0,390	2,633	0,393	2,576	0,396	2,526	0,399	2,482	0,401	2,442	0,404	2,407	0,406	2,374	0,408	2,345	0,410	2,318
20	0,170	993,103	0,224	39,448	0,259	14,167	0,285	8,560	0,304	6,329	0,320	5,168	0,333	4,467	0,343	3,999	0,353	3,667	0,361	3,419	0,368	3,226	0,374	3,073	0,379	2,948	0,384	2,844	0,389	2,756	0,393	2,681	0,396	2,616	0,400	2,559	0,403	2,509	0,406	2,464	0,408	2,425	0,411	2,389	0,413	2,357	0,415	2,327	0,417	2,300
21	0,172	994,286	0,226	39,450	0,262	14,155	0,288	8,546	0,308	6,314	0,324	5,154	0,337	4,452	0,348	3,985	0,357	3,652	0,366	3,403	0,373	3,211	0,379	3,057	0,385	2,932	0,390	2,828	0,395	2,740	0,399	2,665	0,403	2,600	0,406	2,543	0,409	2,493	0,412	2,448	0,415	2,409	0,418	2,373	0,420	2,340	0,422	2,311	0,424	2,284
22	0,173	995,362	0,228	39,452	0,264	14,144	0,291	8,533	0,311	6,301	0,327	5,141	0,341	4,439	0,352	3,971	0,362	3,638	0,370	3,390	0,378	3,197	0,384	3,043	0,390	2,918	0,395	2,814	0,400	2,726	0,405	2,651	0,409	2,585	0,412	2,529	0,416	2,478	0,419	2,434	0,421	2,394	0,424	2,358	0,427	2,325	0,429	2,296	0,431	2,269
23	0,174	996,346	0,230	39,454	0,267	14,134	0,293	8,522	0,314	6,289	0,331	5,128	0,345	4,426	0,356	3,959	0,366	3,626	0,375	3,377	0,382	3,184	0,389	3,031	0,395	2,905	0,401	2,801	0,405	2,713	0,410	2,637	0,414	2,572	0,418	2,515	0,421	2,465	0,424	2,420	0,427	2,380	0,430	2,344	0,433	2,312	0,435	2,282	0,437	2,255
24	0,175	997,249	0,232	39,456	0,269	14,124	0,296	8,511	0,317	6,278	0,334	5,117	0,348	4,415	0,360	3,947	0,370	3,614	0,379	3,365	0,387	3,173	0,394	3,019	0,400	2,893	0,405	2,789	0,410	2,701	0,415	2,625	0,419	2,560	0,423	2,503	0,426	2,452	0,430	2,408	0,433	2,368	0,436	2,331	0,438	2,299	0,441	2,269	0,443	2,242
25	0,176	998,081	0,233	39,458	0,271	14,115	0,298	8,501	0,320	6,268	0,337	5,107	0,351	4,405	0,363	3,937	0,374	3,604	0,383	3,355	0,391	3,162	0,398	3,008	0,404	2,882	0,410	2,778	0,415	2,689	0,419	2,614	0,424	2,548	0,428	2,491	0,431	2,441	0,435	2,396	0,438	2,356	0,441	2,320	0,443	2,287	0,446	2,257	0,448	2,230

DISTRIBUIÇÃO F (α = 0,05) – Valores de $F_{gl1,gl2;0,025}$ e $F_{gl1;gl2;0,975}$ – cont.

	den																							
num	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37	37
26	0,456	2,194	0,458	2,171	0,460	2,150	0,462	2,131	0,464	2,112	0,465	2,095	0,467	2,080	0,469	2,065	0,470	2,051	0,472	2,038	0,473	2,025	0,474	2,014
27	0,461	2,184	0,463	2,161	0,465	2,140	0,467	2,120	0,469	2,102	0,471	2,085	0,472	2,069	0,474	2,054	0,475	2,040	0,477	2,027	0,478	2,015	0,480	2,003
28	0,465	2,174	0,467	2,151	0,470	2,130	0,472	2,110	0,473	2,092	0,475	2,075	0,477	2,059	0,479	2,044	0,480	2,030	0,482	2,017	0,483	2,005	0,485	1,993
29	0,469	2,165	0,472	2,142	0,474	2,121	0,476	2,101	0,478	2,083	0,480	2,066	0,482	2,050	0,483	2,035	0,485	2,021	0,486	2,008	0,488	1,995	0,489	1,983
30	0,473	2,157	0,476	2,133	0,478	2,112	0,480	2,092	0,482	2,074	0,484	2,057	0,486	2,041	0,488	2,026	0,489	2,012	0,491	1,999	0,492	1,986	0,494	1,974
31	0,477	2,148	0,480	2,125	0,482	2,104	0,484	2,084	0,486	2,066	0,488	2,049	0,490	2,033	0,492	2,018	0,493	2,003	0,495	1,990	0,497	1,978	0,498	1,966
32	0,481	2,141	0,483	2,118	0,486	2,096	0,488	2,076	0,490	2,058	0,492	2,041	0,494	2,025	0,496	2,010	0,497	1,996	0,499	1,982	0,501	1,970	0,502	1,958
33	0,484	2,134	0,487	2,110	0,489	2,089	0,491	2,069	0,494	2,051	0,496	2,033	0,498	2,017	0,499	2,002	0,501	1,988	0,503	1,975	0,504	1,962	0,506	1,951
34	0,488	2,127	0,490	2,104	0,493	2,082	0,495	2,062	0,497	2,044	0,499	2,026	0,501	2,010	0,503	1,995	0,505	1,981	0,506	1,968	0,508	1,955	0,510	1,943
35	0,491	2,120	0,493	2,097	0,496	2,076	0,498	2,056	0,500	2,037	0,502	2,020	0,504	2,004	0,506	1,989	0,508	1,974	0,510	1,961	0,512	1,949	0,513	1,937
36	0,494	2,114	0,496	2,091	0,499	2,070	0,501	2,050	0,503	2,031	0,506	2,014	0,508	1,997	0,510	1,982	0,511	1,968	0,513	1,955	0,515	1,942	0,517	1,930
37	0,497	2,109	0,499	2,085	0,502	2,064	0,504	2,044	0,506	2,025	0,509	2,008	0,511	1,991	0,513	1,976	0,515	1,962	0,516	1,949	0,518	1,936	0,520	1,924
38	0,499	2,103	0,502	2,080	0,505	2,058	0,507	2,038	0,509	2,019	0,512	2,002	0,514	1,986	0,516	1,971	0,518	1,956	0,519	1,943	0,521	1,930	0,523	1,918
39	0,502	2,098	0,505	2,074	0,507	2,053	0,510	2,033	0,512	2,014	0,514	1,997	0,516	1,980	0,518	1,965	0,520	1,951	0,522	1,937	0,524	1,925	0,526	1,913
40	0,504	2,093	0,507	2,069	0,510	2,048	0,512	2,028	0,515	2,009	0,517	1,991	0,519	1,975	0,521	1,960	0,523	1,946	0,525	1,932	0,527	1,919	0,529	1,907
41	0,507	2,088	0,510	2,065	0,512	2,043	0,515	2,023	0,517	2,004	0,519	1,987	0,522	1,970	0,524	1,955	0,526	1,941	0,528	1,927	0,529	1,914	0,531	1,902
42	0,509	2,083	0,512	2,060	0,515	2,038	0,517	2,018	0,520	1,999	0,522	1,982	0,524	1,965	0,526	1,950	0,528	1,936	0,530	1,922	0,532	1,910	0,534	1,898
43	0,511	2,079	0,514	2,056	0,517	2,034	0,519	2,014	0,522	1,995	0,524	1,977	0,527	1,961	0,529	1,946	0,531	1,931	0,533	1,918	0,535	1,905	0,536	1,893
44	0,513	2,075	0,516	2,051	0,519	2,030	0,522	2,009	0,524	1,991	0,527	1,973	0,529	1,957	0,531	1,941	0,533	1,927	0,535	1,913	0,537	1,901	0,539	1,888
45	0,515	2,071	0,518	2,047	0,521	2,025	0,524	2,005	0,526	1,986	0,529	1,969	0,531	1,952	0,533	1,937	0,535	1,923	0,537	1,909	0,539	1,896	0,541	1,884
46	0,517	2,067	0,520	2,043	0,523	2,022	0,526	2,001	0,528	1,982	0,531	1,965	0,533	1,948	0,535	1,933	0,537	1,919	0,539	1,905	0,541	1,892	0,543	1,880
47	0,519	2,063	0,522	2,040	0,525	2,018	0,528	1,997	0,530	1,979	0,533	1,961	0,535	1,945	0,537	1,929	0,540	1,915	0,542	1,901	0,544	1,888	0,545	1,876
48	0,521	2,060	0,524	2,036	0,527	2,014	0,530	1,994	0,532	1,975	0,535	1,957	0,537	1,941	0,539	1,925	0,542	1,911	0,544	1,897	0,546	1,884	0,547	1,872
49	0,523	2,056	0,526	2,033	0,529	2,011	0,532	1,990	0,534	1,971	0,537	1,954	0,539	1,937	0,541	1,922	0,543	1,907	0,546	1,894	0,548	1,881	0,549	1,869
50	0,524	2,053	0,528	2,029	0,530	2,007	0,533	1,987	0,536	1,968	0,538	1,950	0,541	1,934	0,543	1,918	0,545	1,904	0,547	1,890	0,549	1,877	0,551	1,865

	den																									
num	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48	49	49	50	50
26	0,475	2,003	0,477	1,993	0,478	1,983	0,479	1,973	0,480	1,964	0,481	1,956	0,482	1,948	0,483	1,940	0,484	1,933	0,485	1,926	0,486	1,919	0,486	1,913	0,487	1,907
27	0,481	1,992	0,482	1,982	0,483	1,972	0,484	1,962	0,485	1,953	0,486	1,945	0,487	1,937	0,488	1,929	0,489	1,922	0,490	1,915	0,491	1,908	0,492	1,902	0,493	1,895
28	0,486	1,982	0,487	1,971	0,488	1,962	0,490	1,952	0,491	1,943	0,492	1,935	0,493	1,927	0,494	1,919	0,495	1,912	0,496	1,904	0,496	1,898	0,497	1,891	0,498	1,885
29	0,491	1,972	0,492	1,962	0,493	1,952	0,494	1,943	0,496	1,934	0,497	1,925	0,498	1,917	0,499	1,909	0,500	1,902	0,501	1,895	0,502	1,888	0,502	1,881	0,503	1,875
30	0,495	1,963	0,497	1,953	0,498	1,943	0,499	1,933	0,500	1,924	0,501	1,916	0,502	1,908	0,503	1,900	0,504	1,893	0,505	1,885	0,506	1,879	0,507	1,872	0,508	1,866
31	0,499	1,955	0,501	1,944	0,502	1,934	0,503	1,925	0,505	1,916	0,506	1,907	0,507	1,899	0,508	1,891	0,509	1,884	0,510	1,877	0,511	1,870	0,512	1,863	0,513	1,857
32	0,504	1,947	0,505	1,936	0,506	1,926	0,508	1,917	0,509	1,908	0,510	1,899	0,511	1,891	0,512	1,883	0,513	1,876	0,514	1,869	0,515	1,862	0,516	1,855	0,517	1,849
33	0,507	1,939	0,509	1,929	0,510	1,919	0,512	1,909	0,513	1,900	0,514	1,892	0,515	1,883	0,516	1,876	0,517	1,868	0,518	1,861	0,519	1,854	0,520	1,847	0,521	1,841
34	0,511	1,932	0,513	1,922	0,514	1,912	0,515	1,902	0,517	1,893	0,518	1,884	0,519	1,876	0,520	1,868	0,521	1,861	0,522	1,854	0,523	1,847	0,524	1,840	0,525	1,834
35	0,515	1,925	0,516	1,915	0,518	1,905	0,519	1,895	0,520	1,886	0,521	1,877	0,523	1,869	0,524	1,861	0,525	1,854	0,526	1,847	0,527	1,840	0,528	1,833	0,529	1,827
36	0,518	1,919	0,520	1,908	0,521	1,898	0,522	1,889	0,524	1,880	0,525	1,871	0,526	1,863	0,527	1,855	0,528	1,847	0,530	1,840	0,531	1,833	0,532	1,826	0,533	1,820
37	0,521	1,913	0,523	1,902	0,524	1,892	0,526	1,882	0,527	1,873	0,528	1,865	0,530	1,856	0,531	1,848	0,532	1,841	0,533	1,834	0,534	1,827	0,535	1,820	0,536	1,814
38	0,524	1,907	0,526	1,896	0,527	1,886	0,529	1,877	0,530	1,867	0,531	1,859	0,533	1,850	0,534	1,842	0,535	1,835	0,536	1,828	0,537	1,821	0,538	1,814	0,539	1,808
39	0,527	1,901	0,529	1,891	0,530	1,881	0,532	1,871	0,533	1,862	0,535	1,853	0,536	1,845	0,537	1,837	0,538	1,829	0,539	1,822	0,541	1,815	0,542	1,808	0,543	1,802
40	0,530	1,896	0,532	1,885	0,533	1,875	0,535	1,866	0,536	1,856	0,537	1,848	0,539	1,839	0,540	1,831	0,541	1,824	0,542	1,816	0,544	1,809	0,545	1,803	0,546	1,796
41	0,533	1,891	0,534	1,880	0,536	1,870	0,538	1,860	0,539	1,851	0,540	1,842	0,542	1,834	0,543	1,826	0,544	1,818	0,545	1,811	0,546	1,804	0,548	1,797	0,549	1,791
42	0,536	1,886	0,537	1,875	0,539	1,865	0,540	1,855	0,542	1,846	0,543	1,837	0,544	1,829	0,546	1,821	0,547	1,813	0,548	1,806	0,549	1,799	0,550	1,792	0,552	1,786
43	0,538	1,881	0,540	1,871	0,541	1,860	0,543	1,851	0,544	1,841	0,546	1,833	0,547	1,824	0,548	1,816	0,550	1,809	0,551	1,801	0,552	1,794	0,553	1,788	0,554	1,781
44	0,540	1,877	0,542	1,866	0,544	1,856	0,545	1,846	0,547	1,837	0,548	1,828	0,550	1,820	0,551	1,812	0,552	1,804	0,553	1,797	0,555	1,790	0,556	1,783	0,557	1,776
45	0,543	1,873	0,544	1,862	0,546	1,852	0,548	1,842	0,549	1,833	0,551	1,824	0,552	1,815	0,553	1,807	0,555	1,800	0,556	1,792	0,557	1,785	0,558	1,778	0,559	1,772
46	0,545	1,869	0,547	1,858	0,548	1,847	0,550	1,838	0,551	1,828	0,553	1,820	0,554	1,811	0,556	1,803	0,557	1,795	0,558	1,788	0,560	1,781	0,561	1,774	0,562	1,768
47	0,547	1,865	0,549	1,854	0,551	1,843	0,552	1,834	0,554	1,824	0,555	1,816	0,557	1,807	0,558	1,799	0,559	1,791	0,561	1,784	0,562	1,777	0,563	1,770	0,564	1,763
48	0,549	1,861	0,551	1,850	0,553	1,840	0,554	1,830	0,556	1,821	0,557	1,812	0,559	1,803	0,560	1,795	0,562	1,787	0,563	1,780	0,564	1,773	0,565	1,766	0,566	1,759
49	0,551	1,857	0,553	1,846	0,555	1,836	0,556	1,826	0,558	1,817	0,559	1,808	0,561	1,799	0,562	1,791	0,564	1,784	0,565	1,776	0,566	1,769	0,567	1,762	0,569	1,756
50	0,553	1,854	0,555	1,843	0,557	1,832	0,558	1,823	0,560	1,813	0,561	1,804	0,563	1,796	0,564	1,788	0,566	1,780	0,567	1,772	0,568	1,765	0,570	1,759	0,571	1,752

DISTRIBUIÇÃO F (α = 0,01) – Valores de $F_{gl1,gl2;0,005}$ e $F_{gl1;gl2;0,995}$

	den																							
num	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
1	0,000	16210,723	0,000	198,501	0,000	55,552	0,000	31,333	0,000	22,785	0,000	18,635	0,000	16,236	0,000	14,688	0,000	13,614	0,000	12,826	0,000	12,226	0,000	11,754
2	0,005	19999,500	0,005	199,000	0,005	49,799	0,005	26,284	0,005	18,314	0,005	14,544	0,005	12,404	0,005	11,042	0,005	10,107	0,005	9,427	0,005	8,912	0,005	8,510
3	0,018	21614,741	0,020	199,166	0,021	47,467	0,022	24,259	0,022	16,530	0,022	12,917	0,023	10,882	0,023	9,596	0,023	8,717	0,023	8,081	0,023	7,600	0,023	7,226
4	0,032	22499,583	0,038	199,250	0,041	46,195	0,043	23,155	0,045	15,556	0,046	12,028	0,046	10,050	0,047	8,805	0,047	7,956	0,048	7,343	0,048	6,881	0,048	6,521
5	0,044	23055,798	0,055	199,300	0,060	45,392	0,064	22,456	0,067	14,940	0,069	11,464	0,070	9,522	0,072	8,302	0,073	7,471	0,073	6,872	0,074	6,422	0,075	6,071
6	0,054	23437,111	0,069	199,333	0,077	44,838	0,083	21,975	0,087	14,513	0,090	11,073	0,093	9,155	0,095	7,952	0,096	7,134	0,098	6,545	0,099	6,102	0,100	5,757
7	0,062	23714,566	0,081	199,357	0,092	44,434	0,099	21,622	0,105	14,200	0,109	10,786	0,113	8,885	0,115	7,694	0,117	6,885	0,119	6,302	0,121	5,865	0,122	5,525
8	0,068	23925,406	0,091	199,375	0,104	44,126	0,114	21,352	0,120	13,961	0,126	10,566	0,130	8,678	0,133	7,496	0,136	6,693	0,139	6,116	0,141	5,682	0,143	5,345
9	0,073	24091,004	0,099	199,388	0,115	43,882	0,126	21,139	0,134	13,772	0,140	10,391	0,145	8,514	0,149	7,339	0,153	6,541	0,156	5,968	0,158	5,537	0,161	5,202
10	0,078	24224,487	0,106	199,400	0,124	43,686	0,136	20,967	0,146	13,618	0,153	10,250	0,159	8,380	0,164	7,211	0,168	6,417	0,171	5,847	0,174	5,418	0,177	5,085
11	0,082	24334,358	0,112	199,409	0,132	43,524	0,145	20,824	0,156	13,491	0,164	10,133	0,171	8,270	0,176	7,104	0,181	6,314	0,185	5,746	0,188	5,320	0,191	4,988
12	0,085	24426,366	0,118	199,416	0,138	43,387	0,153	20,705	0,165	13,384	0,174	10,034	0,181	8,176	0,187	7,015	0,192	6,227	0,197	5,661	0,200	5,236	0,204	4,906
13	0,088	24504,536	0,122	199,423	0,144	43,271	0,160	20,603	0,173	13,293	0,182	9,950	0,190	8,097	0,197	6,938	0,203	6,153	0,207	5,589	0,212	5,165	0,215	4,836
14	0,090	24571,767	0,126	199,428	0,150	43,172	0,167	20,515	0,180	13,215	0,190	9,877	0,199	8,028	0,206	6,872	0,212	6,089	0,217	5,526	0,222	5,103	0,226	4,775
15	0,093	24630,205	0,130	199,433	0,154	43,085	0,172	20,438	0,186	13,146	0,197	9,814	0,206	7,968	0,214	6,814	0,220	6,032	0,226	5,471	0,231	5,049	0,235	4,721
16	0,095	24681,467	0,133	199,437	0,159	43,008	0,177	20,371	0,192	13,086	0,204	9,758	0,213	7,915	0,221	6,763	0,228	5,983	0,234	5,422	0,239	5,001	0,244	4,674
17	0,096	24726,798	0,136	199,441	0,162	42,941	0,182	20,311	0,197	13,033	0,209	9,709	0,219	7,868	0,228	6,718	0,235	5,939	0,241	5,379	0,247	4,959	0,252	4,632
18	0,098	24767,170	0,139	199,444	0,166	42,880	0,186	20,258	0,202	12,985	0,214	9,664	0,225	7,826	0,234	6,678	0,241	5,899	0,248	5,340	0,254	4,921	0,259	4,595
19	0,099	24803,355	0,141	199,447	0,169	42,826	0,190	20,210	0,206	12,942	0,219	9,625	0,230	7,788	0,239	6,641	0,247	5,864	0,254	5,305	0,260	4,886	0,266	4,561
20	0,101	24835,971	0,143	199,450	0,172	42,778	0,193	20,167	0,210	12,903	0,224	9,589	0,235	7,754	0,245	6,608	0,253	5,832	0,260	5,274	0,266	4,855	0,272	4,530
21	0,102	24865,521	0,145	199,452	0,175	42,733	0,196	20,128	0,214	12,868	0,228	9,556	0,239	7,723	0,249	6,578	0,258	5,803	0,265	5,245	0,272	4,827	0,278	4,502
22	0,103	24892,419	0,147	199,454	0,177	42,693	0,199	20,093	0,217	12,836	0,231	9,526	0,243	7,695	0,254	6,551	0,262	5,776	0,270	5,219	0,277	4,801	0,283	4,476
23	0,104	24917,005	0,149	199,456	0,179	42,656	0,202	20,060	0,220	12,807	0,235	9,499	0,247	7,669	0,258	6,526	0,267	5,752	0,275	5,195	0,282	4,778	0,288	4,453
24	0,105	24939,565	0,150	199,458	0,181	42,622	0,205	20,030	0,223	12,780	0,238	9,474	0,251	7,645	0,261	6,503	0,271	5,729	0,279	5,173	0,286	4,756	0,292	4,431
25	0,106	24960,340	0,152	199,460	0,183	42,591	0,207	20,002	0,226	12,755	0,241	9,451	0,254	7,623	0,265	6,482	0,274	5,708	0,283	5,153	0,290	4,736	0,297	4,412

	den																									
num	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25
1	0,000	11,374	0,000	11,060	0,000	10,798	0,000	10,575	0,000	10,384	0,000	10,218	0,000	10,073	0,000	9,944	0,000	9,830	0,000	9,727	0,000	9,635	0,000	9,551	0,000	9,475
2	0,005	8,186	0,005	7,922	0,005	7,701	0,005	7,514	0,005	7,354	0,005	7,215	0,005	7,093	0,005	6,986	0,005	6,891	0,005	6,806	0,005	6,730	0,005	6,661	0,005	6,598
3	0,023	6,926	0,023	6,680	0,023	6,476	0,023	6,303	0,023	6,156	0,023	6,028	0,023	5,916	0,023	5,818	0,023	5,730	0,023	5,652	0,023	5,582	0,023	5,519	0,023	5,462
4	0,049	6,233	0,049	5,998	0,049	5,803	0,049	5,638	0,049	5,497	0,049	5,375	0,049	5,268	0,050	5,174	0,050	5,091	0,050	5,017	0,050	4,950	0,050	4,890	0,050	4,835
5	0,075	5,791	0,076	5,562	0,076	5,372	0,076	5,212	0,077	5,075	0,077	4,956	0,077	4,853	0,077	4,762	0,078	4,681	0,078	4,609	0,078	4,544	0,078	4,486	0,078	4,433
6	0,101	5,482	0,101	5,257	0,102	5,071	0,102	4,913	0,103	4,779	0,103	4,663	0,104	4,561	0,104	4,472	0,105	4,393	0,105	4,322	0,105	4,259	0,106	4,202	0,106	4,150
7	0,124	5,253	0,125	5,031	0,126	4,847	0,126	4,692	0,127	4,559	0,128	4,445	0,128	4,345	0,129	4,257	0,129	4,179	0,130	4,109	0,130	4,047	0,131	3,991	0,131	3,939
8	0,144	5,076	0,146	4,857	0,147	4,674	0,148	4,521	0,149	4,389	0,150	4,276	0,151	4,177	0,151	4,090	0,152	4,013	0,153	3,944	0,153	3,882	0,154	3,826	0,154	3,776
9	0,163	4,935	0,164	4,717	0,166	4,536	0,167	4,384	0,168	4,254	0,170	4,141	0,171	4,043	0,171	3,956	0,172	3,880	0,173	3,812	0,174	3,750	0,175	3,695	0,175	3,645
10	0,179	4,820	0,181	4,603	0,183	4,424	0,184	4,272	0,186	4,142	0,187	4,030	0,188	3,933	0,190	3,847	0,191	3,771	0,192	3,703	0,192	3,642	0,193	3,587	0,194	3,537
11	0,194	4,724	0,196	4,508	0,198	4,329	0,200	4,179	0,202	4,050	0,203	3,938	0,205	3,841	0,206	3,756	0,207	3,680	0,208	3,612	0,209	3,551	0,210	3,497	0,211	3,447
12	0,207	4,643	0,209	4,428	0,212	4,250	0,214	4,099	0,216	3,971	0,218	3,860	0,219	3,763	0,221	3,678	0,222	3,602	0,223	3,535	0,225	3,475	0,226	3,420	0,227	3,370
13	0,219	4,573	0,222	4,359	0,224	4,181	0,227	4,031	0,229	3,903	0,231	3,793	0,233	3,696	0,234	3,611	0,236	3,536	0,237	3,469	0,238	3,408	0,240	3,354	0,241	3,304
14	0,229	4,513	0,233	4,299	0,235	4,122	0,238	3,972	0,240	3,844	0,243	3,734	0,245	3,638	0,246	3,553	0,248	3,478	0,250	3,411	0,251	3,351	0,252	3,296	0,254	3,247
15	0,239	4,460	0,243	4,247	0,246	4,070	0,249	3,920	0,251	3,793	0,253	3,683	0,256	3,587	0,258	3,502	0,259	3,427	0,261	3,360	0,263	3,300	0,264	3,246	0,266	3,196
16	0,248	4,413	0,252	4,200	0,255	4,024	0,258	3,875	0,261	3,747	0,263	3,637	0,266	3,541	0,268	3,457	0,270	3,382	0,272	3,315	0,273	3,255	0,275	3,201	0,276	3,151
17	0,256	4,372	0,260	4,159	0,264	3,983	0,267	3,834	0,270	3,707	0,272	3,597	0,275	3,501	0,277	3,416	0,279	3,342	0,281	3,275	0,283	3,215	0,285	3,161	0,286	3,111
18	0,264	4,334	0,268	4,122	0,272	3,946	0,275	3,797	0,278	3,670	0,281	3,560	0,283	3,465	0,286	3,380	0,288	3,305	0,290	3,239	0,292	3,179	0,294	3,125	0,296	3,075
19	0,271	4,301	0,275	4,089	0,279	3,913	0,282	3,764	0,286	3,637	0,289	3,527	0,291	3,432	0,294	3,347	0,296	3,273	0,299	3,206	0,301	3,146	0,302	3,092	0,304	3,043
20	0,277	4,270	0,281	4,059	0,286	3,883	0,289	3,734	0,293	3,607	0,296	3,498	0,299	3,402	0,301	3,318	0,304	3,243	0,306	3,176	0,308	3,116	0,310	3,062	0,312	3,013
21	0,283	4,243	0,288	4,031	0,292	3,855	0,296	3,707	0,299	3,580	0,303	3,471	0,306	3,375	0,308	3,291	0,311	3,216	0,313	3,149	0,316	3,089	0,318	3,035	0,320	2,986
22	0,288	4,217	0,293	4,006	0,298	3,830	0,302	3,682	0,305	3,555	0,309	3,446	0,312	3,350	0,315	3,266	0,318	3,191	0,320	3,125	0,322	3,065	0,325	3,011	0,327	2,961
23	0,293	4,194	0,298	3,983	0,303	3,807	0,307	3,659	0,311	3,532	0,315	3,423	0,318	3,327	0,321	3,243	0,324	3,168	0,326	3,102	0,329	3,042	0,331	2,988	0,333	2,939
24	0,298	4,173	0,303	3,961	0,308	3,786	0,312	3,638	0,316	3,511	0,320	3,402	0,323	3,306	0,327	3,222	0,329	3,147	0,332	3,081	0,335	3,021	0,337	2,967	0,339	2,918
25	0,303	4,153	0,308	3,942	0,313	3,766	0,317	3,618	0,321	3,492	0,325	3,382	0,329	3,287	0,332	3,203	0,335	3,128	0,338	3,061	0,340	3,001	0,343	2,947	0,345	2,898

DISTRIBUIÇÃO F ($\alpha = 0,01$) – Valores de $F_{gl1,gl2;0,005}$ e $F_{gl1;gl2;0,995}$ – cont.

	den																																																	
num	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48	49	49	50	50
26	0,353	2,835	0,355	2,794	0,357	2,756	0,359	2,722	0,361	2,689	0,362	2,660	0,364	2,632	0,365	2,606	0,367	2,582	0,368	2,559	0,370	2,538	0,371	2,518	0,372	2,499	0,373	2,481	0,374	2,464	0,375	2,448	0,377	2,433	0,378	2,418	0,378	2,405	0,379	2,392	0,380	2,379	0,381	2,367	0,382	2,356	0,383	2,345	0,384	2,335
27	0,358	2,818	0,360	2,777	0,362	2,739	0,364	2,705	0,366	2,672	0,368	2,643	0,369	2,615	0,371	2,589	0,372	2,565	0,374	2,542	0,375	2,521	0,377	2,500	0,378	2,482	0,379	2,464	0,380	2,447	0,381	2,431	0,382	2,416	0,384	2,401	0,385	2,387	0,385	2,374	0,386	2,362	0,387	2,350	0,388	2,339	0,389	2,328	0,390	2,317
28	0,363	2,802	0,365	2,761	0,367	2,724	0,369	2,689	0,371	2,657	0,373	2,627	0,375	2,599	0,376	2,573	0,378	2,549	0,379	2,526	0,381	2,505	0,382	2,484	0,383	2,465	0,385	2,448	0,386	2,431	0,387	2,415	0,388	2,399	0,389	2,385	0,390	2,371	0,391	2,358	0,392	2,346	0,393	2,334	0,394	2,323	0,395	2,312	0,396	2,301
29	0,367	2,788	0,370	2,747	0,372	2,709	0,374	2,674	0,376	2,642	0,378	2,612	0,380	2,584	0,381	2,558	0,383	2,534	0,384	2,511	0,386	2,490	0,387	2,469	0,389	2,450	0,390	2,433	0,391	2,416	0,392	2,400	0,393	2,384	0,395	2,370	0,396	2,356	0,397	2,343	0,398	2,331	0,399	2,319	0,400	2,307	0,400	2,296	0,401	2,286
30	0,372	2,774	0,374	2,733	0,376	2,695	0,379	2,660	0,381	2,628	0,382	2,598	0,384	2,570	0,386	2,544	0,388	2,520	0,389	2,497	0,391	2,475	0,392	2,455	0,394	2,436	0,395	2,418	0,396	2,401	0,397	2,385	0,399	2,370	0,400	2,356	0,401	2,342	0,402	2,329	0,403	2,316	0,404	2,304	0,405	2,293	0,406	2,282	0,407	2,272
31	0,376	2,761	0,378	2,720	0,381	2,682	0,383	2,647	0,385	2,615	0,387	2,585	0,389	2,557	0,391	2,531	0,392	2,506	0,394	2,484	0,395	2,462	0,397	2,442	0,398	2,423	0,400	2,405	0,401	2,388	0,402	2,372	0,403	2,357	0,405	2,342	0,406	2,329	0,407	2,315	0,408	2,303	0,409	2,291	0,410	2,280	0,411	2,269	0,412	2,258
32	0,380	2,748	0,382	2,707	0,385	2,669	0,387	2,635	0,389	2,602	0,391	2,572	0,393	2,544	0,395	2,518	0,397	2,494	0,398	2,471	0,400	2,450	0,401	2,430	0,403	2,411	0,404	2,393	0,406	2,376	0,407	2,359	0,408	2,344	0,409	2,330	0,410	2,316	0,412	2,303	0,413	2,290	0,414	2,278	0,415	2,267	0,416	2,256	0,417	2,245
33	0,384	2,737	0,386	2,696	0,389	2,658	0,391	2,623	0,393	2,591	0,395	2,561	0,397	2,533	0,399	2,507	0,401	2,482	0,402	2,459	0,404	2,438	0,406	2,418	0,407	2,399	0,409	2,381	0,410	2,364	0,411	2,348	0,412	2,332	0,414	2,318	0,415	2,304	0,416	2,291	0,417	2,278	0,418	2,266	0,419	2,255	0,420	2,244	0,421	2,233
34	0,387	2,726	0,390	2,685	0,392	2,647	0,395	2,612	0,397	2,580	0,399	2,550	0,401	2,522	0,403	2,495	0,405	2,471	0,406	2,448	0,408	2,427	0,410	2,407	0,411	2,387	0,413	2,369	0,414	2,352	0,415	2,336	0,417	2,321	0,418	2,306	0,419	2,293	0,420	2,279	0,421	2,267	0,423	2,255	0,424	2,243	0,425	2,233	0,426	2,222
35	0,391	2,716	0,393	2,674	0,396	2,636	0,398	2,601	0,401	2,569	0,403	2,539	0,405	2,511	0,407	2,485	0,408	2,461	0,410	2,438	0,412	2,416	0,414	2,396	0,415	2,377	0,417	2,359	0,418	2,342	0,419	2,326	0,421	2,310	0,422	2,296	0,423	2,282	0,424	2,269	0,426	2,256	0,427	2,244	0,428	2,233	0,429	2,222	0,430	2,211
36	0,394	2,706	0,397	2,664	0,399	2,627	0,402	2,592	0,404	2,559	0,406	2,529	0,408	2,501	0,410	2,475	0,412	2,451	0,414	2,428	0,416	2,406	0,417	2,386	0,419	2,367	0,420	2,349	0,422	2,332	0,423	2,316	0,425	2,300	0,426	2,286	0,427	2,272	0,428	2,259	0,430	2,246	0,431	2,234	0,432	2,222	0,433	2,211	0,434	2,201
37	0,397	2,696	0,400	2,655	0,403	2,617	0,405	2,582	0,407	2,550	0,409	2,520	0,412	2,492	0,414	2,465	0,416	2,441	0,417	2,418	0,419	2,397	0,421	2,376	0,422	2,357	0,424	2,339	0,425	2,322	0,427	2,306	0,428	2,291	0,430	2,276	0,431	2,262	0,432	2,249	0,433	2,236	0,435	2,224	0,436	2,213	0,437	2,202	0,438	2,191
38	0,400	2,687	0,403	2,646	0,406	2,608	0,408	2,573	0,410	2,541	0,413	2,511	0,415	2,483	0,417	2,456	0,419	2,432	0,421	2,409	0,423	2,387	0,424	2,367	0,426	2,348	0,427	2,330	0,429	2,313	0,430	2,297	0,432	2,281	0,433	2,267	0,435	2,253	0,436	2,240	0,437	2,227	0,438	2,215	0,439	2,203	0,440	2,192	0,441	2,182
39	0,403	2,679	0,406	2,638	0,409	2,600	0,411	2,565	0,413	2,532	0,416	2,502	0,418	2,474	0,420	2,448	0,422	2,423	0,424	2,400	0,426	2,379	0,428	2,359	0,429	2,339	0,431	2,321	0,432	2,304	0,434	2,288	0,435	2,273	0,437	2,258	0,438	2,244	0,439	2,231	0,441	2,218	0,442	2,206	0,443	2,195	0,444	2,183	0,445	2,173
40	0,406	2,671	0,409	2,630	0,411	2,592	0,414	2,557	0,416	2,524	0,419	2,494	0,421	2,466	0,423	2,440	0,425	2,415	0,427	2,392	0,429	2,371	0,431	2,350	0,432	2,331	0,434	2,313	0,436	2,296	0,437	2,280	0,439	2,264	0,440	2,250	0,441	2,236	0,443	2,222	0,444	2,210	0,445	2,198	0,446	2,186	0,447	2,175	0,449	2,164
41	0,409	2,663	0,411	2,622	0,414	2,584	0,417	2,549	0,419	2,516	0,422	2,486	0,424	2,458	0,426	2,432	0,428	2,407	0,430	2,384	0,432	2,363	0,434	2,342	0,435	2,323	0,437	2,305	0,439	2,288	0,440	2,272	0,442	2,256	0,443	2,242	0,445	2,228	0,446	2,214	0,447	2,202	0,448	2,190	0,450	2,178	0,451	2,167	0,452	2,156
42	0,411	2,656	0,414	2,614	0,417	2,576	0,419	2,541	0,422	2,509	0,424	2,479	0,427	2,451	0,429	2,424	0,431	2,400	0,433	2,377	0,435	2,355	0,437	2,335	0,438	2,316	0,440	2,297	0,442	2,280	0,443	2,264	0,445	2,249	0,446	2,234	0,448	2,220	0,449	2,207	0,450	2,194	0,452	2,182	0,453	2,170	0,454	2,159	0,455	2,149
43	0,414	2,649	0,416	2,607	0,419	2,569	0,422	2,534	0,424	2,502	0,427	2,472	0,429	2,443	0,431	2,417	0,434	2,393	0,436	2,370	0,438	2,348	0,439	2,328	0,441	2,308	0,443	2,290	0,445	2,273	0,446	2,257	0,448	2,241	0,449	2,227	0,451	2,213	0,452	2,199	0,453	2,187	0,455	2,174	0,456	2,163	0,457	2,152	0,458	2,141
44	0,416	2,642	0,419	2,601	0,422	2,563	0,424	2,527	0,427	2,495	0,429	2,465	0,432	2,437	0,434	2,410	0,436	2,386	0,438	2,363	0,440	2,341	0,442	2,321	0,444	2,301	0,446	2,283	0,447	2,266	0,449	2,250	0,450	2,234	0,452	2,220	0,453	2,206	0,455	2,192	0,456	2,179	0,457	2,167	0,459	2,156	0,460	2,145	0,461	2,134
45	0,418	2,636	0,421	2,594	0,424	2,556	0,427	2,521	0,429	2,488	0,432	2,458	0,434	2,430	0,437	2,404	0,439	2,379	0,441	2,356	0,443	2,334	0,445	2,314	0,447	2,295	0,448	2,277	0,450	2,259	0,452	2,243	0,453	2,227	0,455	2,213	0,456	2,199	0,458	2,185	0,459	2,173	0,460	2,161	0,462	2,149	0,463	2,138	0,464	2,127
46	0,420	2,629	0,423	2,588	0,426	2,550	0,429	2,515	0,432	2,482	0,434	2,452	0,437	2,424	0,439	2,397	0,441	2,373	0,443	2,350	0,445	2,328	0,447	2,308	0,449	2,288	0,451	2,270	0,453	2,253	0,454	2,237	0,456	2,221	0,457	2,206	0,459	2,192	0,460	2,179	0,462	2,166	0,463	2,154	0,464	2,142	0,466	2,131	0,467	2,121
47	0,422	2,623	0,426	2,582	0,428	2,544	0,431	2,509	0,434	2,476	0,436	2,446	0,439	2,418	0,441	2,391	0,443	2,367	0,446	2,344	0,448	2,322	0,450	2,301	0,451	2,282	0,453	2,264	0,455	2,247	0,457	2,230	0,458	2,215	0,460	2,200	0,461	2,186	0,463	2,173	0,464	2,160	0,466	2,148	0,467	2,136	0,468	2,125	0,469	2,114
48	0,424	2,618	0,428	2,576	0,431	2,538	0,433	2,503	0,436	2,470	0,439	2,440	0,441	2,412	0,443	2,385	0,446	2,361	0,448	2,338	0,450	2,316	0,452	2,296	0,454	2,276	0,456	2,258	0,457	2,241	0,459	2,224	0,461	2,209	0,462	2,194	0,464	2,180	0,465	2,167	0,467	2,154	0,468	2,142	0,469	2,130	0,471	2,119	0,472	2,108
49	0,426	2,612	0,430	2,571	0,433	2,533	0,435	2,497	0,438	2,465	0,441	2,434	0,443	2,406	0,446	2,380	0,448	2,355	0,450	2,332	0,452	2,310	0,454	2,290	0,456	2,271	0,458	2,252	0,460	2,235	0,461	2,219	0,463	2,203	0,465	2,188	0,466	2,174	0,468	2,161	0,469	2,148	0,471	2,136	0,472	2,124	0,473	2,113	0,475	2,102
50	0,428	2,607	0,432	2,565	0,435	2,527	0,437	2,492	0,440	2,459	0,443	2,429	0,445	2,401	0,448	2,374	0,450	2,350	0,452	2,327	0,454	2,305	0,456	2,284	0,458	2,265	0,460	2,247	0,462	2,230	0,464	2,213	0,465	2,198	0,467	2,183	0,469	2,169	0,470	2,155	0,472	2,143	0,473	2,130	0,474	2,119	0,476	2,107	0,477	2,097

TABELA I Números aleatórios.

98 08 62 48 26	45 24 02 84 04	44 99 90 88 96	39 09 47 34 07	35 44 13 18 80
33 18 51 62 32	41 94 15 09 49	89 43 54 85 81	88 69 54 19 94	37 54 87 30 43
80 95 10 04 06	96 38 27 07 74	20 15 12 33 87	25 01 62 52 98	94 62 46 11 71
79 75 24 91 40	71 96 12 82 96	69 86 10 25 91	74 85 22 05 39	00 38 75 95 79
18 63 33 25 37	98 14 50 65 71	31 01 02 46 74	05 45 56 14 27	77 93 89 19 36
74 02 94 39 02	77 55 73 22 70	97 79 01 71 19	52 52 75 80 21	80 81 45 17 48
54 17 84 56 11	80 99 33 71 43	05 33 51 29 69	56 12 71 92 55	36 04 09 03 24
11 66 44 98 83	52 07 98 48 27	59 38 17 15 39	09 97 33 34 40	88 46 12 33 56
48 32 47 79 28	31 24 96 47 10	02 29 53 68 70	32 30 75 75 46	15 02 00 99 94
69 07 49 41 38	87 63 79 19 76	35 58 40 44 01	10 51 82 16 15	01 84 87 69 38
09 18 82 00 97	32 82 53 95 27	04 22 08 63 04	83 38 98 73 74	64 27 85 80 44
90 04 58 54 97	51 98 15 06 54	98 93 88 19 97	91 87 07 61 50	68 47 66 46 59
73 18 95 02 07	47 67 72 52 69	62 29 06 44 64	27 12 46 70 18	41 36 18 27 60
75 76 89 64 90	20 97 18 17 49	90 42 91 22 72	95 37 50 58 71	93 82 34 31 78
54 01 64 40 56	66 28 13 10 03	00 68 22 73 98	20 71 45 32 95	07 70 61 78 13
08 35 86 99 10	78 54 24 27 85	13 66 15 88 73	04 61 89 75 53	21 22 30 84 20
28 30 60 32 64	81 33 31 05 91	40 51 00 78 93	32 60 46 04 75	94 11 90 18 40
53 84 08 62 33	81 59 41 36 28	51 21 59 02 90	28 46 66 87 95	77 76 22 07 91
91 75 75 37 41	61 61 36 22 69	50 26 39 02 12	55 78 17 65 14	83 48 34 70 55
89 41 59 26 94	00 39 75 83 91	12 60 71 76 46	48 94 97 23 06	94 54 13 74 08
77 51 30 38 20	86 83 42 99 01	68 41 48 27 74	51 90 81 39 80	72 89 35 55 07
19 50 23 71 74	69 97 92 02 88	55 21 02 97 73	74 28 77 52 51	65 34 46 74 15
21 81 85 93 13	93 27 88 17 57	05 68 67 31 56	07 08 28 50 46	31 85 33 84 52
51 47 46 64 99	68 10 72 36 21	94 04 99 13 45	42 83 60 91 91	08 00 74 54 49
99 55 96 83 31	62 53 52 41 70	69 77 71 28 30	74 81 97 81 42	43 86 07 28 34
33 71 34 80 07	93 58 47 28 69	51 92 66 47 21	58 30 32 98 22	93 17 49 39 72
85 27 48 68 93	11 30 32 92 70	28 83 43 41 37	73 51 59 04 00	71 14 84 36 43
84 13 38 96 40	44 03 55 21 66	73 85 27 00 91	61 22 26 05 61	62 32 71 84 23
56 73 21 62 34	17 39 59 61 31	10 12 39 16 22	85 49 65 75 60	81 60 41 88 80
65 13 85 68 06	87 64 88 52 61	34 31 36 58 61	45 87 52 10 69	85 64 44 72 77
38 00 10 21 76	81 71 91 17 11	71 60 29 29 37	74 21 96 40 49	65 58 44 96 98
37 40 29 63 97	01 30 47 75 86	56 27 11 00 86	47 32 46 26 05	40 03 03 74 38
97 12 54 03 48	87 08 33 14 17	21 81 53 92 50	75 23 76 20 47	15 50 12 95 78
21 82 64 11 34	47 14 33 40 72	64 63 88 59 02	49 13 90 64 41	03 85 65 45 52
73 13 54 27 42	95 71 90 90 35	85 79 47 42 96	08 78 98 81 56	64 69 11 92 02
07 63 87 79 29	03 06 11 80 72	96 20 74 41 56	23 82 19 95 38	04 71 36 69 94
60 52 88 34 41	07 95 41 98 14	59 17 52 06 95	05 53 35 21 39	61 21 20 64 55
83 59 63 56 55	06 95 89 29 83	05 12 80 97 19	77 43 35 37 83	92 30 15 04 98
10 85 06 27 46	99 59 91 05 07	13 49 90 63 19	53 07 57 18 39	06 41 01 93 62
39 82 09 89 52	43 62 26 31 47	64 42 18 08 14	43 80 00 93 51	31 02 47 31 67

Fonte: Blalock (1960).