## One-Sided Group Sequential Tests

ONE-SIDED TESTS

Table 4.1 Constants  $\tilde{C}_1(K,\alpha,\beta,\Delta)$ ,  $\tilde{C}_2(K,\alpha,\beta,\Delta)$  and  $\tilde{R}(K,\alpha,\beta,\Delta)$  for power family one-sided tests with shape parameter  $\Delta$ . Also shown are expected sample sizes at  $\theta=0, \delta/2$  and  $\delta$  expressed as percentages of the corresponding fixed sample size. Tests are for K groups of observations. Type I error probability  $\alpha=0.05$  at  $\theta=0$  and power  $I-\beta=0.8$  at  $\theta=\delta$ .

					Expected	Expected sample size, as per-	ze, as per-	
	X	ات	Ç,	×	centage o	ffixed sam	centage of fixed sample size, at	
					$\theta = 0$	$\theta = \delta/2$	$\theta = \delta$	
$\Delta = -0.5$	_							
	-	1.645	0.842	1.000	100.0	100.0	100.0	
	7	1.632	0.870	1.012	75.3	90.9	95.7	
	m	1.622	668.0	1.028	72.8	86.4	87.5	
	4	1,621	0.916	1.041	0.69	83.5	84.9	
	S	1.622	0.927	1.051	67.0	82.0	83.0	
	10	1.628	0.956	1.080	63.8	78.9	9.6	
	15	1.632	0.970	1.095	62.8	78.0	78.5	
	20	1,635	0.978	1.104	62.4	77.5	78.0	
$\Delta = -0.25$	5							
	_	1.645	0.842	1,000	100.0	100.0	100.0	
	7	1,623	0,901	1.031	71.7	87.7	6'06	
	m	1,625	0.928	1.055	67.7	83.3	84.7	
	4	1.629	0.947	1.073	65.4	80.9	81.6	
	2	1.633	0.960	1.087	63.5	79.3	6.67	
	10	1.646	0.993	1.127	60.1	76.2	76.5	
	15	1,653	1.009	1.146	59.0	75.2	75.5	
	20	1.658	1.018	1.158	58.5	74.8	74.9	
$\Delta = 0.0$								
	_	1,645	0.842	1.000	100.0	100.0	100.0	
	7	1.634	0.942	1.073	6.69	84.9	85.6	
	٣	1.645	0.978	1.113	63.4	80.2	6'08	
	4	1.656	0.999	1.140	8.09	77.8	78.0	
	2	1.664	1.015	1.161	59.2	76.3	76.2	
	01	1.688	1.057	1.219	55.8	73.2	72.8	
	15	1.700	1.076	1.247	54.7	72.1	71.7	
	20	1.708	1.088	1.264	7.7	71.6	71.1	
$\Delta = 0.25$								
	-	1.645	0.842	1.000	100.0	0.001	100.0	
	7	1.688	0.660	1.160	70.5	83.9	82.7	
×	m	1.720	1.054	1.245	61.9	78.5	77.2	
	4	1,741	1.093	1.299	58.0	75.8	74.4	
	S	1.757	1.119	1.338	55.9	74.1	72.6	
	10	1.802	1.185	1.443	51.7	9.07	8.89	
	15	1.823	1.215	1.493	50.3	69.3	67.5	
	20	1.837	1.233	1.524	49.5	68.7	8.99	

## THE POWER FAMILY OF ONE-SIDED GROUP SEQUENTIAL TESTS

Table 4.2 Constants  $\tilde{C}_1(K,\alpha,\beta,\Delta)$ ,  $\tilde{C}_2(K,\alpha,\beta,\Delta)$  and  $\tilde{R}(K,\alpha,\beta,\Delta)$  power family one-sided tests with shape parameter  $\Delta$ . Also shown are expect sample sizes at  $\theta=0,\delta/2$  and  $\delta$  expressed as percentages of the correspondit fixed sample size. Tests are for K groups of observations. Type I errorbability  $\alpha=0.05$  at  $\theta=0$  and power  $1-\beta=0.9$  at  $\theta=\delta$ .

$\vec{R}$ centage of fixed sample $\theta = 0$ $\theta = 5/2$ 1 1000         100.0         100.0           2 1.012         34.7         96.4           2 1.012         77.8         90.1           2 1.021         77.8         90.1           2 1.022         68.7         98.7           3 1.065         67.6         81.7           4 1.045         67.1         81.2           6 1.030         73.9         87.5           7 1.040         100.0         100.0           1 1.047         68.2         84.7           4 1.044         63.7         79.1           4 1.104         63.7         79.1           5 1.104         63.2         78.6           1 1.14         63.2         78.6           2 1.104         63.2         78.6           3 1.11         66.6         81.7           4 1.104         63.2         78.6           5 1.104         63.2         78.6           6 1.114         63.2         78.6           7 1.072         68.2         84.2           8 1.134         69.0         75.9           9 1.121						Expected	Expected sample size, as per	e, as per-	
1,645   1.282   1.000   100.0   100		×	ښ	Ç,	ıα	centage of	fixed sam	ole size, at	
1,645   1,282   1,000   1,00						$\theta = 0$	$\theta = \delta/2$	$\theta = \theta$	
1,645   1282   1.000   100.0	9								
1,643   1,286   1,002   847   964     3   1,643   1,392   1,012   77.8   90.1     4   1,645   1,392   1,012   77.8   90.1     5   1,648   1,320   1,012   77.3   87.5     10   1,660   1,342   1,022   68.7   81.7     20   1,671   1,360   1,073   67.1   81.2     1   1,645   1,282   1,000   1,000   1,000   1     2   1,663   1,320   1,030   7,39   87.5     3   1,650   1,344   1,044   70.2   84.7     4   1,656   1,344   1,044   70.2   84.7     5   1,690   1,344   1,044   70.2   84.7     6   1,681   1,371   1,087   64.8   80.1     7   1,645   1,282   1,000   1,000   1,000   1     8   1,673   1,357   1,072   68.2   84.2     9   1,673   1,357   1,074   63.3   88.5     1   1,645   1,282   1,104   63.7   79.1     1   1,645   1,282   1,000   1,000   1,000   1     1   1,645   1,282   1,000   1,000   1,000   1     1   1,645   1,282   1,000   1,000   1,000   1     1   1,645   1,282   1,195   58.4   75.4     1   1,645   1,282   1,195   58.4   75.4     1   1,645   1,282   1,195   58.4   75.4     1   1,447   1,452   1,18   80.1   77.0     1   1,447   1,452   1,18   80.1   77.4     1   1,486   1,282   1,000   1,000   1,000   1     1   1,485   1,546   1,285   1,281   1,490   1,255   59.1   77.4     1   1,484   1,588   1,490   1,573   72.3     1   1,484   1,588   1,490   1,573   7.2     1   1,844   1,588   1,490   1,573   7.2     1   1,844   1,588   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,388   1,400   33.2   72.3     1,794   1,482   1,384   1,400   33.2   72.3     1,794   1,482   1,484   1,484   1,484   1,484   1,484   1,484   1,484   1,484   1,484   1,484		1	1,645	1.282	1.000	100.0	100.0	100.0	
1,643   1,302   1,012   77,8   90,1     4   1,645   1,312   1,021   73,9   87,5     5   1,645   1,312   1,021   73,9   87,5     10   1,660   1,342   1,022   68,7   8,2,7     11   1,645   1,282   1,000   1,000   1,000     12   1,643   1,320   1,011   77,8   8,2,6     13   1,650   1,320   1,011   77,8   8,2,7     14   1,656   1,344   1,044   70,2   84,7     15   1,660   1,344   1,044   70,2   84,7     16   1,681   1,371   1,087   64,8   80,1     15   1,690   1,384   1,104   63,7   79,1     1   1,645   1,282   1,000   1,000   1,000     1   1,645   1,322   1,042   68,5   84,2     1   1,645   1,322   1,044   63,2   88,5     1   1,645   1,325   1,044   63,2   8,42     1   1,447   1,452   1,195   8,44   75,4     1   1,447   1,452   1,195   8,44   7,54     1   1,490   1,255   1,14   8,52     1   1,490   1,255   1,14   8,52     1   1,490   1,255   1,314   1,44   8,51     1   1,490   1,255   1,314   1,44   8,51     1   1,490   1,255   1,315   1,315     1   1,484   1,388   1,400   3,23   7,23     1   1,484   1,588   1,400   3,32   7,23     1   1,484   1,588   1,400   3,32   7,23     1   1,484   1,588   1,400   3,32   7,23     1   1,484   1,588   1,400   3,32   7,23     1,548   1,588   1,400   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,588   1,500   3,32   7,23     1,548   1,548   1,548   1,540   3,32   7,23     1,548   1,548   1,540   1,525   3,32   7,23     1,548   1,540   1,525   3,32   7,23     1,548   1,540   1,542   1,540   1,542   1,540     1,548   1,540   1,542   1,540   1,542   1,540     1,548   1,540   1,542   1,540   1,542   1,540     1,544   1,544   1,544   1,544   1,544   1,544     1,544   1,544   1,544   1,544   1,544   1,544   1,544   1,544   1,544   1,544   1,544   1,5		7	1.643	1.286	1.002	84.7	96.4	94.3	
4         1,645         1,312         1,021         73.9         87.5           5         1,668         1,320         1,029         72.3         85.9           10         1,667         1,320         1,029         72.3         85.9           20         1,671         1,360         1,073         67.1         81.2           21         1,637         1,320         1,073         67.1         81.2           2         1,650         1,320         1,000         100.0         100.0         11           2         1,650         1,320         1,011         77.8         87.5         4.6         81.7           4         1,650         1,344         1,044         70.2         84.7         5.4         80.1         1.04         70.2         84.7         1.04         80.1         1.04         70.2         84.7         1.04         1.05         88.1         1.04         63.2         83.2         1.04         1.05         88.1         1.04         1.02         84.7         1.04         1.05         88.1         1.04         1.02         84.7         1.04         1.05         1.00         1.00         1.00         1.00         1.00         <		3	1.643	1,302	1,012	77.8	90.1	84.3	
5         1,648         1,320         1,029         72,3         85.9           10         1,660         1,342         1,022         68.7         82.7           20         1,671         1,360         1,073         68.7         82.7           20         1,671         1,360         1,073         67.1         81.2           21         1,643         1,382         1,000         100.0         100.0           2         1,643         1,300         1,011         77.8         92.6           3         1,650         1,324         1,044         70.2         84.7           4         1,662         1,344         1,044         70.2         84.7           5         1,660         1,344         1,055         68.2         83.2           1         1,643         1,371         1,044         70.2         84.7           2         1,660         1,392         1,114         63.7         79.1           2         1,660         1,392         1,114         63.2         84.2           3         1,677         1,327         1,044         63.2         84.2           4         1,686         1,392		4	1.645	1.312	1.021	73.9	87.5	81.6	
10   1.660   1.342   1.052   68.7   82.7     15   1.667   1.353   1.065   67.6   81.7     1   1.643   1.282   1.000   100.0   100.0     2   1.643   1.282   1.000   100.0   100.0     3   1.650   1.320   1.031   77.8   92.6     4   1.665   1.344   1.044   70.2   84.7     5   1.662   1.344   1.044   70.2   84.7     6   1.681   1.371   1.087   64.8   80.1     7   1.690   1.384   1.104   63.7   79.1     8   1.690   1.384   1.104   63.7   79.1     9   1.690   1.384   1.104   63.7   79.1     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.004   63.2   88.5     1   1.645   1.382   1.043   88.5     1   1.645   1.382   1.014   63.8     1   1.645   1.382   1.114   63.8     1   1.645   1.382   1.114   63.8     1   1.645   1.382   1.114   63.8     1   1.645   1.382   1.111   63.8     1   1.645   1.382   1.111   63.8     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.195   58.4   75.4     1   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.195   58.4   75.4     1   1.645   1.282   1.195   58.4   75.4     1   1.645   1.282   1.195   58.4   75.4     1   1.645   1.282   1.195   58.4   75.4     1   1.645   1.282   1.195   58.1   77.4     1   1.181		S	1.648	1.320	1.029	72,3	85.9	9.62	
15   1.667   1.333   1.065   67.6   81.7     16   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.000   100.0   100.0     2   1.643   1.282   1.000   100.0   100.0     3   1.650   1.324   1.044   70.2   84.7     4   1.656   1.334   1.044   70.2   84.7     5   1.662   1.344   1.044   70.2   84.7     6   1.669   1.344   1.044   63.2   84.7     7   1.645   1.282   1.000   100.0   100.0     8   1.645   1.282   1.000   100.0   100.0     9   1.645   1.282   1.000   100.0   100.0     1   1.645   1.282   1.044   63.2   88.5     1   1.645   1.382   1.043   68.5   88.5     1   1.645   1.382   1.043   68.5   88.5     1   1.645   1.282   1.000   100.0   100.0     1   1.447   1.452   1.181   59.0   75.9     1   1.645   1.282   1.000   100.0   100.0     1   1.447   1.452   1.181   59.0   75.9     2   1.710   1.389   1.121   71.4   86.2     3   1.747   1.452   1.195   58.4   75.4     4   1.770   1.469   1.255   61.0   79.0     5   1.788   1.490   1.255   59.1   77.4     6   1.864   1.588   1.400   53.2   72.3     1   1.864   1.588   1.400   53.2   72.3     1   1.864   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.588   1.400   53.2   72.3     1   1.844   1.840   1.840   1.840   1.840     1   1   1.840   1.840   1.840   1.840   1.840     1   1   1   1.840   1.840   1.840   1.840   1.840   1.840     1   1   1.8440   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840   1.840		10	1.660	1.342	1.052	68.7	82.7	76.0	
1.645   1.282   1.073   67.1   81.2     1.645   1.282   1.000   100.0   100.0     1.656   1.320   1.011   77.8   92.6     1.656   1.320   1.001   77.8   87.5     1.656   1.344   1.045   68.2   83.2     1.656   1.344   1.055   68.2   83.2     1.651   1.690   1.392   1.114   63.2   79.1     1.645   1.282   1.040   63.7   79.1     1.645   1.282   1.040   63.7   79.1     1.645   1.282   1.040   63.7   79.1     1.645   1.382   1.043   68.2   88.5     1.656   1.392   1.114   63.2   88.5     1.657   1.357   1.045   68.2   88.5     1.656   1.392   1.111   63.8   80.1     1.773   1.425   1.185   60.1   77.0     1.770   1.482   1.185   60.1   77.0     1.770   1.482   1.195   58.4   75.4     1.770   1.482   1.191   63.8   81.4     1.770   1.482   1.283   1.211   71.4   86.2     1.788   1.490   1.255   59.1   77.4     1.788   1.490   1.255   59.1   77.4     1.784   1.588   1.400   33.2   72.3     1.874   1.884   1.400   33.2   72.3     1.874   1.884   1.400   33.2   72.3     1.874   1.884   1.884   1.894   72.3     1.785   1.784   1.884   1.884   1.884   7.2     1.784   1.884   1.884   1.884   7.2     1.785   1.784   1.884   1.884   1.884   7.2     1.785   1.784   1.884   1.884   1.884   7.2     1.785   1.784   1.884   1.884   1.884   1.884   7.2     1.785   1.784   1.884   1.884   1.884   1.884   7.2     1.785   1.784   1.784   1.884   1.884   1.884   7.2     1.785   1		2	1 667	1.353	1.065	9.79	81.7	74.9	
1.645   1.282   1.000   100.0   100.0   1   1.645   1.282   1.000   100.0   100.0   1   2.1643   1.300   1.011   77.8   92.6   1.656   1.334   1.044   70.2   84.7   1.656   1.344   1.055   68.2   83.2   1.662   1.344   1.055   68.2   83.2   1.690   1.392   1.114   63.2   79.1   1.681   1.371   1.087   64.8   80.1   1.645   1.382   1.043   3.30   88.5   1.645   1.382   1.043   3.30   88.5   1.645   1.382   1.043   3.30   88.5   1.696   1.382   1.114   63.2   84.2   1.696   1.389   1.111   63.8   80.1   1.70   1.000   1.		20	1.671	1.360	1.073	67.1	81.2	74.3	
1   1,645   1,282   1,000	0.2	5							
2         1.643         1.300         1.011         77.8         92.6           3         1.656         1.320         1.030         73.9         87.5           4         1.662         1.344         1.04         68.2         83.2           10         1.681         1.371         1.087         64.8         80.1           15         1.690         1.384         1.04         63.7         79.1           20         1.667         1.322         1.114         63.2         78.6           2         1.667         1.322         1.044         63.2         88.5           3         1.673         1.327         1.047         68.2         84.2           4         1.686         1.375         1.049         65.6         81.7           5         1.696         1.399         1.111         63.8         80.1           10         1.775         1.425         1.181         59.0         75.9           20         1.747         1.452         1.195         58.4         75.4           3         1.746         1.485         1.181         59.0         75.9           2         1.747         1.469		_	1.645	1.282	1.000	100.0	0.001	100.0	
1,650   1,320   1,030   71,9   87,5     1,656   1,334   1,044   70,2   84,7     1,681   1,371   1,087   64,8   80,1     1,690   1,384   1,104   63,7   79,1     1,690   1,384   1,104   63,7   79,1     1,645   1,282   1,000   100,0   100,0     1,645   1,382   1,043   68,2   84,2     1,645   1,382   1,094   65,6   81,7     1,645   1,387   1,094   65,6   81,7     1,646   1,389   1,111   63,8   80,1     1,790   1,482   1,18   59,0   75,9     1,747   1,482   1,195   58,4   75,4     1,700   1,389   1,121   71,4   86,2     1,710   1,389   1,121   71,4   86,2     1,710   1,389   1,121   71,4   86,2     1,710   1,480   1,285   61,0   70,0     1,788   1,490   1,255   59,1   77,4     1,886   1,396   1,285   1,291   72,9     1,874   1,878   1,386   1,316   64,2   7,29     1,874   1,878   1,386   1,400   33,2   7,23     1,874   1,878   1,588   1,400   33,2   7,23     1,874   1,588   1,400   53,2   7,23		7	1.643	1.300	1.011	77.8	97.6	87.9	
4         1.656         1.334         1.044         70.2         84.7           5         1.662         1.344         1.055         68.2         83.2           10         1.681         1.371         1.087         64.8         80.1           15         1.696         1.384         1.104         63.7         79.1           20         1.696         1.382         1.114         63.2         78.6           2         1.673         1.322         1.000         100.0         100.0         1           3         1.673         1.332         1.043         88.5         84.2         84.2           4         1.686         1.375         1.094         65.6         81.7         84.2           4         1.686         1.375         1.094         65.6         81.7         84.2           5         1.696         1.389         1.111         63.8         80.1         77.0           16         1.779         1.422         1.181         59.0         75.9           2         1.747         1.452         1.195         58.4         75.4           3         1.747         1.452         1.09         100.0		'n	1,650	1.320	1,030	73.9	87.5	81.3	
1,662   1,344   1,055   68.2   83.2   1,068   1,371   1,087   64.8   80.1   1,168   1,371   1,087   64.8   80.1   1,168   1,392   1,114   63.2   79.1   1,164   1,392   1,114   63.2   79.1   1,164   1,322   1,043   1,332   1,043   1,332   1,043   1,337   1,043   1,345   1,044   1,345   1,104   63.6   84.2   4   1,686   1,389   1,111   63.8   80.1   1,170		4	1.656	1.334	1.044	70.2	84.7	17.77	
10   1.681   1.371   1.087   64.8   80.1     15   1.690   1.384   1.104   63.7   79.1     20   1.696   1.392   1.114   63.2   78.6     2   1.645   1.282   1.000   100.0   100.0     3   1.673   1.332   1.043   73.0   88.5     4   1.686   1.375   1.094   65.6   81.7     5   1.696   1.389   1.111   63.8   80.1     10   1.725   1.425   1.18   69.1   77.0     15   1.799   1.442   1.181   59.0   75.9     2   1.710   1.452   1.195   58.4   75.4     3   1.464   1.282   1.000   100.0   100.0     4   1.770   1.469   1.225   61.0   79.0     5   1.788   1.490   1.225   61.0   79.0     6   1.386   1.346   1.348   1.346   64.2   81.4     1   1.864   1.388   1.364   64.2   77.4     1   1.886   1.386   1.385   1.396   33.2   72.3     1   1.874   1.878   1.346   33.2   72.3     1   1.874   1.878   1.340   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1.874   1.588   1.400   53.2   72.3     1   1   1.874   1.588   1.400   53.2   72.3     1   1   1   1.874   1.588   1.400   53.2   72.3     1   1   1   1.874   1.588   1.400   53.2   72.3     1   1   1   1.874   1.588   1.400   53.2   72.3     1   1   1   1.445   1.588   1.400   53.2   72.3     1   1   1   1   1   1   1   1   1		S	1.662	1.344	1.055	68.2	83.2	16.0	
15   1.690   1.384   1.104   63.7   79.1     20   1.665   1.392   1.114   63.2   78.6     2   1.667   1.282   1.000   100.0   100.0     2   1.667   1.325   1.004   68.2   84.2     3   1.673   1.357   1.072   68.2   84.2     4   1.686   1.375   1.094   65.5   81.7     5   1.696   1.389   1.111   63.8   81.7     10   1.725   1.425   1.18   60.1   77.0     15   1.799   1.442   1.181   59.0   75.9     2   1.710   1.482   1.195   58.4   75.4     3   1.746   1.482   1.195   58.4   75.4     4   1.770   1.469   1.282   1.000   100.0   100.0     5   1.788   1.490   1.255   59.1   77.4     1   1.865   1.284   1.184   64.2   81.4     1   1.867   1.285   1.285   61.0   79.0     1   1.886   1.490   1.255   59.1   77.4     1   1.896   1.572   1.375   33.9   72.9     2   1.874   1.588   1.400   53.2   72.3     2   1.874   1.588   1.400   53.2   72.3     3   1.874   1.588   1.400   53.2   72.3     4   1.884   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     5   1.804   1.588   1.400   53.2   72.3     6   1.405   1.505   50.1   72.3     7   7   7   7   7   7   7   7   7		10	1.681	1.371	1.087	8.4	80.1	72.5	
20 1.696 1.392 1.114 63.2 78.6 1 1.645 1.282 1.000 100.0 100.0 1 2 1.657 1.332 1.043 73.0 88.5 2 1.657 1.332 1.043 73.0 88.5 4 1.686 1.375 1.094 65.6 81.7 5 1.696 1.389 1.111 63.8 80.1 10 1.725 1.425 1.138 60.1 77.0 15 1.739 1.442 1.181 53.0 75.9 20 1.747 1.452 1.195 58.4 75.4 5 1 1.645 1.282 1.000 100.0 100.0 13 2 1.710 1.389 1.121 71.4 86.2 2 1.710 1.389 1.121 71.4 86.2 3 1.746 1.438 1.131 64.2 5 1.788 1.490 1.255 59.1 77.4 1 1.886 1.346 1.355 53.2 74.1 15 1.880 1.572 1.375 53.9 72.3 2 1.784 1.588 1.400 53.2 72.3		15	1.690	1.384	1.104	63.7	79.1	71.4	
1   1645   1.282   1.000   100.0   1		20	1.696	1.392	1.114	63.2	9.87	40.7	
1 1.645 1.282 1.000 100.0 100.0 13 16.3 1.673 1.332 1.043 73.0 88.5 2 4 1.686 1.375 1.074 68.2 84.2 2 1.686 1.375 1.074 65.6 81.7 2 1.686 1.375 1.094 65.6 81.7 2 1.696 1.389 1.111 65.8 80.1 17.0 17.2 1.42 1.181 60.1 77.0 1.70 1.452 1.195 58.4 75.4 1.70 1.452 1.195 58.4 75.4 1.70 1.452 1.195 58.4 75.4 1.70 1.389 1.121 71.4 86.2 3 1.70 1.489 1.225 61.0 79.0 5 1.788 1.490 1.255 59.1 77.4 1.886 1.575 1.38 1.386 1.356 5.35 7.25 7.35 1.36 1.36 1.36 1.36 1.36 1.36 1.36 1.36	0.0								
2         1.657         1.332         1.043         73.0         88.5           3         1.673         1.357         1.072         68.2         84.2           4         1.686         1.357         1.072         68.2         84.2           5         1.696         1.389         1.111         63.8         80.1           10         1.725         1.425         1.181         80.0         77.0           15         1.739         1.442         1.181         59.0         75.9           20         1.747         1.452         1.195         58.4         75.4           2         1.710         1.389         1.121         71.4         86.2           2         1.710         1.389         1.124         64.2         81.4           4         1.770         1.469         1.225         61.0         79.0           5         1.788         1.490         1.255         59.1         77.4           4         1.770         1.469         1.225         61.0         79.0           5         1.788         1.490         1.255         59.1         77.4           10         1.856         1.572		-	1.645	1.282	1.000	100.0	100.0	100.0	
3 1673 1357 1072 682 84.2 4 1.686 1375 1094 65.6 81.7 10 1.725 1.425 1.118 60.1 77.0 15 1.739 1.442 1.181 59.0 75.9 20 1.747 1.452 1.195 58.4 75.4 21 1.10 1.389 1.121 71.4 86.2 21 1.710 1.389 1.121 71.4 86.2 3 1.746 1.438 1.184 64.2 81.4 4 1.770 1.469 1.225 61.0 79.0 5 1.78 1.490 1.255 59.1 77.4 10 1.836 1.575 1.375 51.9 10 1.836 1.575 1.375 51.9 10 1.836 1.575 1.375 51.9 10 1.836 1.575 1.375 51.9 20 1.874 1.888 1.400 53.2 72.9		7	1.657	1.332	1.043	73.0	88.5	81.4	
4 1686 11375 1094 65.5 81.7 16.6 11375 1094 65.5 81.7 17.0 10 1.725 1.425 1.138 60.1 77.0 15.1 17.2 1.425 1.138 60.1 77.0 15.1 1.425 1.138 59.0 75.9 17.4 1.452 1.195 58.4 75.4 17.0 1.89 1.121 71.4 86.2 2 1.710 1.389 1.121 71.4 86.2 3 1.770 1.469 1.225 61.0 79.0 5 1.788 1.490 1.255 59.1 77.4 10 1.836 1.546 1.336 55.2 74.1 15.8 1.860 1.572 1.375 53.9 77.9 1.886 1.846 1.34		ľ٦	1.673	1.357	1.072	68.2	84.2	76.7	
5         1.696         1.389         1.111         65.8         80.1           10         1.725         1.425         1.138         60.1         77.0           20         1.747         1.452         1.181         89.4         75.9           20         1.747         1.452         1.195         58.4         75.9           1         1.645         1.282         1.000         100.0         100.0         1           2         1.710         1.389         1.121         71.4         86.2         3           3         1.746         1.438         1.184         64.2         81.4           4         1.770         1.469         1.225         61.0         79.0           5         1.788         1.490         1.255         59.1         77.4           10         1.836         1.346         53.2         74.1           11         1.860         1.572         1.378         1.29           20         1.874         1.386         1.400         33.2         72.3		4	1.686	1.375	1.094	9.59	81.7	73.7	
10   1.725   1.425   1.158   60.1   77.0     15   1.739   1.442   1.181   59.0   75.9     20   1.747   1.452   1.195   58.4   75.4     1   1.645   1.282   1.000   100.0   100.0     2   1.710   1.389   1.121   71.4   86.2     3   1.746   1.438   1.184   64.2   81.4     4   1.770   1.469   1.225   61.0   79.0     5   1.788   1.490   1.255   59.1   77.4     10   1.836   1.546   1.336   55.2   74.1     11   1.860   1.572   1.375   53.9   72.9     20   1.874   1.588   1.400   53.2   72.3     1.500   1.572   1.400   53.2   72.3     1.500   1.572   1.400   53.2   72.3     1.500   1.572   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.572   1.588   1.400   53.2   72.3     1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.500   1.500   1.500   1.500   1.500   1.500     1.500   1.50		40	1.696	1.389	1,111	63.8	80.1	71.8	
15   1739   1.442   1.181   59.0   75.9   1.47   1.452   1.195   58.4   75.4   1.47   1.452   1.195   58.4   75.4   1.47   1.452   1.100   100.0   100.0   1.100   1		10	1.725	1,425	1.158	60.1	77.0	68.2	
20 1.747 1.452 1.195 58.4 75.4 1 1.645 1.282 1.000 100.0 100.0 1 2 1.710 1.389 1.121 71.4 86.2 2 1.710 1.469 1.225 61.0 79.0 5 1.788 1.490 1.255 59.1 77.4 10 1.836 1.546 1.336 55.2 74.1 15 1.860 1.572 1.375 53.9 72.9 20 1.874 1.588 1.400 53.2 72.3		15	1.739	1.442	1.181	59.0	75.9	67.1	
1 1.645 1.282 1.000 100.0 100.0 1 3 1.746 1.438 1.121 71.4 86.2 2 4 1.770 1.469 1.225 61.0 79.0 5 1.788 1.490 1.255 59.1 77.4 10 1.836 1.346 1.336 55.2 74.1 115 1.860 1.572 1.375 53.9 72.9 20 1.874 1.588 1.400 53.2 72.3		20	1.747	1,452	1,195	58.4	75.4	66.5	
1.645         1.282         1.000         100.0         100.0         1           1.710         1.389         1.121         71.4         86.2         1           1.746         1.438         1.184         66.2         81.4         1         7         1           1.770         1.469         1.225         61.0         79.0         7         1         7         4           1.788         1.490         1.255         59.1         77.4         1         7         4         1         1         8         1         4         1         1         1         4         1         1         4         1         1         1         4         1	0.25								
1.710 1.389 1.121 71.4 86.2 1.746 1.438 1.184 64.2 81.4 1.770 1.469 1.225 61.0 79.0 1.788 1.490 1.255 59.1 77.4 1.836 1.546 1.336 55.2 74.1 1.874 1.588 1.400 53.2 72.3		-	1.645	1.282	1.000	100.0	100.0	100.0	
1.746 1.438 1.184 64.2 81.4 1.770 1.469 1.225 61.0 79.0 1.786 1.490 1.255 59.1 77.4 1.836 1.546 1.336 55.2 74.1 1.874 1.588 1.400 53.2 72.3		7	1.710	1.389	1.121	71.4	86.2	77.8	
1.770 1.469 1.225 61.0 79.0 1.788 1.490 1.255 59.1 77.4 1.836 1.546 1.336 55.2 74.1 1.860 1.572 1.375 53.9 72.9 1.874 1.588 1.400 53.2 72.3		6	1.746	1.438	1.184	64.5	81,4	72.0	
1.788 1.490 1.255 59.1 77.4 1.836 1.546 1.316 55.2 74.1 1.860 1.572 1.375 53.9 72.9 1.874 1.588 1.400 53.2 72.3		4	1.770	1.469	1.225	61.0	79.0	69.1	
1.836     1.546     1.336     55.2     74.1       1.860     1.572     1.375     53.9     72.9       1.874     1.588     1.400     53.2     72.3		2	1.788	1.490	1.255	59.1	17.4	67.3	
1.860 1.572 1.375 53.9 72.9 1.874 1.588 1.400 53.2 72.3		10	1.836	1.546	1.336	55.2	74.1	63.5	
1.874 1.588 1.400 53.2 72.3		15	1.860	1.572	1.375	53.9	72.9	62.2	
		20	1.874	1.588	1.400	53.2	72.3	61.5	

$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	sample sizes at $\theta=0$ , $\delta/2$ and $\delta$ expressed as percentages of the corresponding fixed sample size. Tests are for $K$ groups of observations, Type $I$ error probability $\alpha=0.05$ at $\theta=0$ and power $1-\beta=0.95$ at $\theta=\delta$ .	$e \sin \theta$ $x = 0$	$u\theta = 0, \delta/2$ size. Tests $= 0.05 \text{ at } \theta :$	and 8 expressed are for K grou = 0 and power 1	pressed as $p$ K groups $power 1 - \beta$	s percentag so of obse $-\beta = 0.95$	percentages of the co of observations, $\beta$ $\beta = 0.95$ at $\theta = \delta$ .	corresponding Type I erro
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		×	ıü	2	ia	Expecter centage o	l sample si: If fixed sam	ze, as per- ple size, at
= -0.25  = -	ا					$\theta = 0$	$\theta = \delta/2$	$\theta = \theta$
1, 1645   1645   1000	ة ا				000	000	1000	0001
= -0.25 = -0.2		<u> </u>	1.645	56.	0001	100.0	0.00	0.001
1,050   1,050   1,00		7	1,645	3.5	000.	91.6	98.4	0.16
= -0.25 = -0.2		m ·	1.650	1.650	1.006	37.7	91.9	7.08
10   1.676   1.676   1.039   72.0   84.4     15   1.685   1.685   1.049   70.9   83.3     20   1.690   1.056   70.3   82.8     1   1.645   1.645   1.000   100.0   100.0     2   1.649   1.649   1.005   83.8   95.1     3   1.661   1.661   1.020   77.5   89.2     4   1.670   1.670   1.031   73.5   86.6     5   1.670   1.670   1.031   73.5   86.6     10   1.689   1.689   1.040   71.7   83.8     15   1.710   1.710   1.081   67.0   80.8     2   1.717   1.717   1.090   66.4   80.3     3   1.687   1.687   1.087   1.052   72.5     4   1.702   1.702   1.071   69.0   83.4     5   1.713   1.085   67.0   83.4     6   1.745   1.125   63.3   78.7     7   1.745   1.745   1.125   63.2   77.6     8   1.762   1.770   1.181   61.6   77.1     9   1.770   1.770   1.181   63.6   82.9     1   1.645   1.645   1.000   100.0   100.0     1   1.647   1.787   1.181   63.6   82.9     1   1.881   1.881   1.307   56.6   73.4     1   1.881   1.881   1.307   56.6   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9		4 ~	1.661	1.661	1.019	75.8	87.7	75.8
= -0.25  = -0.25  1 1.645 1.696 1.056 70.3 82.8  1 1.645 1.649 1.005 83.3 82.8  1 1.645 1.649 1.005 83.8 82.8  2 1.649 1.649 1.005 83.8 82.1  2 1.649 1.649 1.005 83.8 82.1  1 1.649 1.649 1.007 77.5 89.2  1 1.649 1.650 1.031 77.5 85.0  1 1.649 1.699 1.067 68.1 81.8  1 1.710 1.710 1.081 67.0 80.8  2 1.710 1.717 1.090 66.4 80.3  2 1.648 1.648 1.000 100.0 100.0 10.0  1 1.645 1.645 1.007 100.0 100.0 10.0  2 1.670 1.702 1.071 69.0 83.4  4 1.702 1.702 1.071 69.0 83.4  5 1.713 1.713 1.085 67.0 81.8  1 1.645 1.645 1.007 100.0 100.0 10.0  2 1.722 1.726 1.445 67.6 82.9  2 1.722 1.727 1.737 1.181 63.6 82.9  4 1.787 1.787 1.181 63.6 82.9  4 1.787 1.787 1.181 63.6 82.9  4 1.787 1.877 1.871 1.87 1.88 61.8  1 1.881 1.881 1.307 56.6 77.4  1 1.881 1.881 1.307 56.6 77.9		10	1.676	9/9	1.039	72.0	84.4	72.0
= -0.25  = -0.25  = -0.25  1 1.645 1.645 1.000 100.0 100.0 1 2 1.649 1.649 1.005 83.8 83.8 95.1 1 2 1.649 1.649 1.005 83.8 89.2 1 3 1.661 1.670 1.031 77.5 86.6 1 1.670 1.070 17.7 85.0 10 1.059 1.067 88.1 81.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1		15	1.685	1.685	1.049	70.9	83,3	400
= -0.25  1 1.645 1.645 1.000 100.0 100.0 1  2 1649 1649 1.005 83.8 95.1 3 1.661 1.000 1.005 77.5 89.2 4 1.670 1.670 1.031 73.5 86.6 5 1.677 1.677 1.040 71.7 85.0 10 1.659 1.667 68.1 81.8 15 1.710 1.710 1.081 67.0 80.8 20.8 20.9 1.668 1.087 1.081 67.0 80.8 20.8 1.687 1.687 1.080 100.0 10.880 1.881 1.307 56.6 13.8 78.9 1.881 1.307 56.0 73.9		20	1.690	1.690	1.056	70.3	82.8	70,3
1.645   1.645   1.000   100.0   100.0   1   2   1.649   1.649   1.0015   83.8   95.1     3   1.661   1.0010   1.75   83.2     4   1.670   1.670   1.031   73.5   86.6     5   1.677   1.677   1.040   71.7   85.0     10   1.699   1.667   68.1   81.8     12   1.710   1.710   1.081   67.0   80.8     20   1.717   1.717   1.090   66.4   80.3     3   1.687   1.645   1.064   100.0   100.0     4   1.02   1.717   1.011   68.0   83.4     5   1.713   1.131   1.085   67.0   81.8     10   1.745   1.745   1.125   63.3   78.7     15   1.760   1.760   1.145   66.2   77.6     1   1.645   1.645   1.000   100.0   100.0     2   1.722   1.097   72.9   82.9     4   1.787   1.787   1.181   63.6   82.9     5   1.806   1.806   1.206   61.8   78.9     6   1.881   1.381   1.307   56.6   73.4     7   1.881   1.381   1.307   56.6   73.9     1   1.881   1.381   1.307   56.6   73.9     1   1.881   1.381   1.307   56.6   73.9     1   1.881   1.381   1.307   56.6   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.300   1.328   56.0   73.9     1   1.896   1.300   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56.0   73.9     1   1.896   1.328   56	- II	45						
= 0.0 = 0.25 = 0.0 = 0.25 = 0.25		-	1.645	1.645	1.000	100.0	0'001	100.0
3   1.661   1.661   1.020   77.5   89.2     4   1.670   1.670   1.031   73.5   86.6     5   1.670   1.670   1.031   73.5   86.6     10   1.659   1.699   1.067   68.1   81.8     15   1.710   1.710   1.081   67.0   80.8     20   1.717   1.717   1.090   66.4   80.3     1   1.645   1.648   1.028   76.6   90.5     2   1.688   1.688   1.028   76.2   86.0     4   1.702   1.702   1.071   69.0   83.4     5   1.713   1.713   1.085   67.0   81.8     10   1.745   1.745   1.125   63.2   77.6     1   1.645   1.645   1.040   100.0   100.0     2   1.722   1.725   1.131   66.6   82.9     3   1.762   1.762   1.477   66.6   82.9     4   1.787   1.787   1.181   63.6   82.9     5   1.806   1.806   1.206   61.8   78.9     6   1.881   1.307   56.6   73.4     7   1.881   1.881   1.307   56.6   73.9     7   1.881   1.881   1.307   56.6   73.9     7   1.895   1.886   1.328   56.0   73.9     7   1.896   1.886   1.328   56.0   73.9     8   1.381   1.397   56.6   73.9     8   1.381   1.397   56.6   73.9     9   1.896   1.886   1.328   56.0   73.9     1   1.881   1.881   1.307   56.6   73.9     1   1.897   1.288   1.328   56.0   73.9     1   1.897   1.328   56.0   73.9     1   1.897   1.328   56.0   73.9     1   1.896   1.328   73.22   73.22   73.22   73.22   73.22   73.22   73.22   73.22   73.22		7	1.649	1.649	1.005	83.8	95.1	83.8
= 0.0 = 0.0 1		3	199'1	1,661	1.020	77.5	89.2	77.5
5 1,677 1,677 1,040 71.7 85.0 10 1,659 1,699 1,067 68.1 81.8 15 1,710 1,711 1,090 66.4 80.3 2 1,668 1,668 1,028 76.6 90.5 3 1,687 1,687 1,022 7,22 86.0 4 1,702 1,701 1,031 65.0 90.5 3 1,687 1,687 1,082 72.2 86.0 4 1,702 1,702 1,071 69.0 81.8 10 1,745 1,745 1,125 63.3 78.7 10 1,745 1,745 1,125 63.3 78.7 11 1,645 1,647 1,000 100.0 100.0 1 2 1,722 1,707 1,188 61.6 77.1 2 1,722 1,722 1,097 72.9 87.4 3 1,762 1,787 1,181 63.6 82.9 4 1,787 1,787 1,181 63.6 82.9 5 1,806 1,806 1,206 61.8 78.9 10 1,81 1,81 1,307 56.6 74.4 20 1,896 1,896 1,328 56.0 73.9		4	1.670	1.670	1.031	73.5	9.98	73.5
10   1699   1,697   68,1   81.8   15   1710   1,710   1,081   67,0   80.8   20   1,717   1,717   1,090   66.4   80.3   2   1,668   1,668   1,028   76.6   90.5   2   1,668   1,668   1,028   76.6   90.5   4   1,702   1,713   1,082   67.0   81.8   10   1,745   1,745   1,125   67.0   81.8   10   1,745   1,745   1,125   63.3   78.7   15   1,760   1,760   1,145   62.2   77.6   1,145   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,146   1,147   1,181   1,146   1,181   1,146   1,181		2	1.677	1.677	1.040	71.7	85.0	71.7
= 0.0  = 0.0  1		10	1.699	1,699	1,067	68.1	81.8	68.1
20 1,717 1,717 1,090 66.4 80.3 =0.0 1 1,645 1,645 1,000 100.0 100.0 10.0 2 1,668 1,668 1,028 7,6.2 86.0 3 1,687 1,687 1,022 7,2.2 86.0 4 1,702 1,702 1,071 69.0 83.4 5 1,713 1,713 1,085 67.0 81.8 10 1,745 1,745 1,125 63.3 77.7 15 1,760 1,760 1,145 61.5 77.1 =0.25 1 1,72 1,72 1,73 1,13 61.00 100.0 10.0 1 1,645 1,645 1,000 100.0 100.0 1 2 1,72 1,72 1,73 1,181 63.6 82.9 4 1,787 1,787 1,181 63.6 82.9 1 1,881 1,881 1,307 56.6 74.4 2 1,881 1,881 1,307 56.6 73.9		15	1.710	1.710	1.081	0.79	80.8	0.79
= 0.0  1 1,645 1,645 1,000 100.0 100.0 100.0 12 1,668 1.688 1.688 1.688 1.688 1.689 1.689 1.680 83.4 4 1.702 1,702 1,071 69.0 83.4 1.00 1.702 1,071 69.0 83.4 1.00 1.702 1,071 69.0 83.4 1.00 1.700 1,45 61.6 77.1 15 1.700 1,45 61.6 77.1 15 1.700 1,45 61.6 77.1 16.4 1.700 1,700 1,45 61.6 77.1 16.4 1.700 1,700 1,40		20	1.717	1,717	1.090	66.4	80.3	66.4
= 0.25 = 0.25								
2 1.668 1.668 1.023 7.66 90.5 3 1.687 1.087 1.032 7.2.2 86.0 4 1.702 1.071 1.072 1.071 89.0 83.4 10 1.745 1.745 1.125 63.3 78.7 11 1.760 1.760 1.145 62.2 77.6 20 1.770 1.770 1.158 61.6 77.1 1 1.645 1.645 1.000 100.0 100.0 1 2 1.722 1.097 72.9 87.4 3 1.762 1.762 1.147 66.6 82.9 4 1.787 1.787 1.181 63.6 82.9 5 1.806 1.806 1.206 61.8 78.9 10 1.877 1.877 1.214 88.0 73.6 10 1.871 1.881 1.307 56.6 73.4 20 1.896 1.896 1.238 56.0 73.9		-	1.645	1.645	1.000	100.0	100.0	100.0
1,687   1,687   1,052   7,22   86.0		2	1.668	1.668	1.028	9.92	90,5	9.9/
4 1.702 1.702 1.071 69.0 83.4 5 1.713 1.713 1.085 67.0 81.8 10 1.745 1.745 1.125 63.3 78.7 11 1.745 1.745 1.125 63.2 77.6 20 1.770 1.770 1.158 61.6 77.1 1 1.645 1.645 1.000 100.0 100.0 13 2 1.722 1.722 1.097 72.9 87.4 3 1.762 1.762 1.147 66.6 82.9 4 1.787 1.787 1.181 63.6 80.4 5 1.806 1.806 1.206 61.8 78.9 10 1.857 1.251 1.307 56.6 73.4 20 1.881 1.881 1.307 56.6 73.9		6	1.687	1.687	1.052	72.2	86.0	72.2
= 0.25 = 0.25 = 0.773 1.773 1.085 67.0 81.8 10 1.745 1.745 1.125 63.3 78.7 15 1.760 1.145 61.6 77.1 1 1.645 1.645 1.000 100.0 100.0 1 2 1.722 1.722 1.097 72.9 87.4 4 1.787 1.787 1.181 63.6 82.9 4 1.787 1.87 1.81 63.6 82.9 10 1.857 1.81 1.307 56.6 1.8 10 1.857 1.881 1.307 56.6 73.9 2 1.782 1.881 1.307 56.6 73.4 1 1.881 1.881 1.307 56.6 73.9		4	1.702	1.702	1.071	0.69	83.4	0.69
10 1.745 1.745 1.125 63.3 78.7 15.125 15.125 62.2 77.6 20 1.770 1.158 61.6 77.1 1.645 1.645 1.000 100.0 100.0 1 1 1.645 1.645 1.000 100.0 100.0 1 1 1.645 1.762 1.097 72.9 87.4 3 1.762 1.762 1.147 66.6 82.9 4 1.787 1.787 1.181 63.5 80.4 5 1.806 1.806 1.206 61.8 78.9 10 1.877 1.871 1.377 1.81 63.5 80.4 5 1.806 1.806 1.206 61.8 78.9 10 1.871 1.811 1.307 56.6 74.4 20 1.896 1.896 1.328 56.0 73.9		S	1.713	1.713	1.085	67.0	8.8	0.79
15 1.760 1.760 1.145 62.2 77.6 20 1.770 1.770 1.158 61.6 77.1 = 0.25 1 1.645 1.645 1.000 100.0 100.0 1 2 1.722 1.097 72.9 87.4 3 1.762 1.762 1.147 66.6 82.9 4 1.787 1.787 1.181 63.6 82.9 5 1.806 1.806 1.206 61.8 78.9 10 1.857 1.274 88.0 75.6 11 1.881 1.881 1.307 56.6 74.4 20 1.896 1.896 1.328 56.0 73.9		10	1.745	1,745	1.125	63.3	78.7	63.3
20 1.770 1.770 1.158 61.6 77.1 = 0.25 1 1.645 1.645 1.000 100.0 100.0 1 2 1.722 1.097 72.9 87.4 3 1.762 1.147 66.6 82.9 4 1.787 1.787 1.181 63.6 82.9 5 1.806 1.806 1.206 61.8 78.9 10 1.857 1.274 5.80 75.6 15 1.881 1.881 1.307 56.6 74.4 20 1.896 1.896 1.328 56.0 73.9		15	1.760	1.760	1.145	62.2	77.6	62.2
= 0.25 1 1.645 1.645 1.000 100.0 100.0 100.0 1 2 1.722 1.722 1.477 66.6 82.9 4 4 1.787 1.787 1.181 63.6 82.9 83.4 83.6 1.206 61.8 78.9 10 1.857 1.274 58.0 75.6 11 1.81 1.81 1.81 1.81 1.307 56.6 71.4 20 1.896 1.896 1.328 56.0 73.9		20	1.770	1,770	1,158	919	17.1	9.19
1.645         1.645         1.600         190.0         190.0         1           1.722         1.72         1.72         1.81         66.6         82.9           1.787         1.787         1.181         65.6         82.9           1.787         1.787         1.181         66.6         80.4           1.806         1.806         1.206         61.8         78.9           1.897         1.87         1.274         88.0         75.6           1.881         1.881         1.307         56.6         74.4           1.896         1.896         1.328         56.0         73.9	$\Delta = 0.25$							
1.722 1.722 1.097 72.9 87.4 1.762 1.762 1.147 66.6 82.9 1.787 1.787 1.181 63.6 80.4 1.806 1.806 1.206 61.8 78.9 1.837 1.857 1.274 58.0 75.6 1.891 1.881 1.307 56.6 74.4 1.896 1.896 1.328 56.0 73.9		-	1.645	1.645	1.000	100.0	100.0	100.0
1.762 1.762 1.147 66.6 82.9 1.787 1.787 1.181 65.6 80.4 1.806 1.806 1.206 61.8 78.9 1.857 1.857 1.274 58.0 75.6 1.891 1.881 1.307 56.6 74.4 1.896 1.896 1.328 56.0 73.9		7	1.722	1.722	1.097	72.9	87,4	72.9
1.787 1.787 1.181 63.6 80.4 1.806 1.806 1.206 61.8 78.9 1.857 1.87 1.274 58.0 75.6 1.891 1.881 1.307 56.6 73.9		3	1.762	1.762	1.147	9.99	82,9	9.99
1.806 1.806 1.206 61.8 78.9 1.857 1.837 1.274 58.0 75.6 1.881 1.881 1.307 56.6 74.4 1.896 1.896 1.328 56.0 73.9		4	1.787	1.787	1.181	63.6	80.4	63.6
1.857 1.857 1.274 58.0 75.6 1.881 1.881 1.307 56.6 74.4 1.896 1.896 1.328 56.0 73.9		2	1.806	1.806	1.206	61.8	78.9	61.8
1.896 1.896 1.328 56.0 73.9		10	1.857	1.857	1.274	58.0	75.6	58.0
1.896 1.896 1.328 56.0 73.9		15	1.881	1.881	1.307	9999	74.4	56.6
		20	1.896	1.896	1.328	26.0	73.9	26.0