One-Sided Group Sequential 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* Δ. *Also shown are expected sample sizes at* $\theta = 0$, $\delta/2$ *and* δ *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* $1 - \beta = 0.8$ *at* $\theta = \delta$.

	K	$\tilde{C}_1$	$\tilde{C}_2$	$\tilde{R}$	Expected sample size, as percentage of fixed sample size, at		
					$\theta=0$	$\theta=\delta/2$	$\theta=\delta$
$\Delta = -0.5$							
	1	1.645	0.842	1.000	100.0	100.0	100.0
	2	1.632	0.870	1.012	75.3	90.9	95.7
	3	1.622	0.899	1.028	72.8	86.4	87.5
	4	1.621	0.916	1.041	69.0	83.5	84.9
	5	1.622	0.927	1.051	67.0	82.0	83.0
	10	1.628	0.956	1.080	63.8	78.9	79.6
	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
$\Delta = -0.25$							
	1	1.645	0.842	1.000	100.0	100.0	100.0
	2	1.623	0.901	1.031	71.7	87.7	90.9
	3	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
	5	1.633	0.960	1.087	63.5	79.3	79.9
	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	1.645	0.842	1.000	100.0	100.0	100.0
	2	1.634	0.942	1.073	69.9	84.9	85.6
	3	1.645	0.978	1.113	63.4	80.2	80.9
	4	1.656	0.999	1.140	60.8	77.8	78.0
	5	1.664	1.015	1.161	59.2	76.3	76.2
	10	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	54.1	71.6	71.1
$\Delta = 0.25$							
	1	1.645	0.842	1.000	100.0	100.0	100.0
	2	1.688	0.990	1.160	70.5	83.9	82.7
	3	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
	5	1.757	1.119	1.338	55.9	74.1	72.6
	10	1.802	1.185	1.443	51.7	70.6	68.8
	15	1.823	1.215	1.493	50.3	69.3	67.5
	20	1.837	1.233	1.524	49.5	68.7	66.8

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

	K	$\tilde{C}_1$	$\tilde{C}_2$	$\tilde{R}$	Expected sample size, as percentage of fixed sample size, at		
					$\theta=0$	$\theta=\delta/2$	$\theta=\delta$
$\Delta = -0.5$							
	1	1.645	1.282	1.000	100.0	100.0	100.0
	2	1.643	1.286	1.002	84.7	96.4	94.3
	3	1.643	1.302	1.012	77.8	90.1	84.3
	4	1.645	1.312	1.021	73.9	87.5	81.6
	5	1.648	1.320	1.029	72.3	85.9	79.6
	10	1.660	1.342	1.052	68.7	82.7	76.0
	15	1.667	1.353	1.065	67.6	81.7	74.9
	20	1.671	1.360	1.073	67.1	81.2	74.3
$\Delta = -0.25$							
	1	1.645	1.282	1.000	100.0	100.0	100.0
	2	1.643	1.300	1.011	77.8	92.6	87.9
	3	1.650	1.320	1.030	73.9	87.5	81.3
	4	1.656	1.334	1.044	70.2	84.7	77.7
	5	1.662	1.344	1.055	68.2	83.2	76.0
	10	1.681	1.371	1.087	64.8	80.1	72.5
	15	1.690	1.384	1.104	63.7	79.1	71.4
	20	1.696	1.392	1.114	63.2	78.6	70.9
$\Delta = 0.0$							
	1	1.645	1.282	1.000	100.0	100.0	100.0
	2	1.657	1.332	1.043	73.0	88.5	81.4
	3	1.673	1.357	1.072	68.2	84.2	76.7
	4	1.686	1.375	1.094	65.6	81.7	73.7
	5	1.696	1.389	1.111	63.8	80.1	71.8
	10	1.725	1.425	1.158	60.1	77.0	68.2
	15	1.739	1.442	1.181	59.0	75.9	67.1
	20	1.747	1.452	1.195	58.4	75.4	66.5
$\Delta = 0.25$							
	1	1.645	1.282	1.000	100.0	100.0	100.0
	2	1.710	1.389	1.121	71.4	86.2	77.8
	3	1.746	1.438	1.184	64.2	81.4	72.0
	4	1.770	1.469	1.225	61.0	79.0	69.1
	5	1.788	1.490	1.255	59.1	77.4	67.3
	10	1.836	1.546	1.336	55.2	74.1	63.5
	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

Table 4.3 *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* Δ. *Also shown are expected sample sizes at* $\theta = 0$, $\delta/2$ *and* δ *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* $\theta = \delta$.

	K	$\tilde{C}_1$	$\tilde{C}_2$	$\tilde{R}$	Expected sample size, as percentage of fixed sample size, at		
					$\theta=0$	$\theta=\delta/2$	$\theta=\delta$
$\Delta = -0.5$							
	1	1.645	1.645	1.000	100.0	100.0	100.0
	2	1.645	1.645	1.000	91.6	98.4	91.6
	3	1.650	1.650	1.006	80.7	91.9	80.7
	4	1.656	1.656	1.013	77.9	89.4	77.9
	5	1.661	1.661	1.019	75.8	87.7	75.8
	10	1.676	1.676	1.039	72.0	84.4	72.0
	15	1.685	1.685	1.049	70.9	83.3	70.9
	20	1.690	1.690	1.056	70.3	82.8	70.3
$\Delta = -0.25$							
	1	1.645	1.645	1.000	100.0	100.0	100.0
	2	1.649	1.649	1.005	83.8	95.1	83.8
	3	1.661	1.661	1.020	77.5	89.2	77.5
	4	1.670	1.670	1.031	73.5	86.6	73.5
	5	1.677	1.677	1.040	71.7	85.0	71.7
	10	1.699	1.699	1.067	68.1	81.8	68.1
	15	1.710	1.710	1.081	67.0	80.8	67.0
	20	1.717	1.717	1.090	66.4	80.3	66.4
$\Delta = 0.0$							
	1	1.645	1.645	1.000	100.0	100.0	100.0
	2	1.668	1.668	1.028	76.6	90.5	76.6
	3	1.687	1.687	1.052	72.2	86.0	72.2
	4	1.702	1.702	1.071	69.0	83.4	69.0
	5	1.713	1.713	1.085	67.0	81.8	67.0
	10	1.745	1.745	1.125	63.3	78.7	63.3
	15	1.760	1.760	1.145	62.2	77.6	62.2
	20	1.770	1.770	1.158	61.6	77.1	61.6
$\Delta = 0.25$							
	1	1.645	1.645	1.000	100.0	100.0	100.0
	2	1.722	1.722	1.097	72.9	87.4	72.9
	3	1.762	1.762	1.147	66.6	82.9	66.6
	4	1.787	1.787	1.181	63.6	80.4	63.6
	5	1.806	1.806	1.206	61.8	78.9	61.8
	10	1.857	1.857	1.274	58.0	75.6	58.0
	15	1.881	1.881	1.307	56.6	74.4	56.6
	20	1.896	1.896	1.328	56.0	73.9	56.0