Table A-8. Critical values (at 5% and 1% significance levels) for Duncan's Multiple Range Test.

| | $\alpha = .05$ Number of consecutive means ( p ) to be compared | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| df | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 100 |
| 1 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 | 17.97 |
| 2 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 | 6.085 |
| 3 | 4.501 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 | 4.516 |
| 4 | 3.927 | 4.013 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 |
| 5 | 3.635 | 3.749 | 3.797 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 | 3.814 |
| 6 | 3.461 | 3.587 | 3.649 | 3.694 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 | 3.697 |
| 7 | 3.344 | 3.477 | 3.548 | 3.611 | 3.622 | 3.626 | 3.626 | 3.616 | 3.616 | 3.626 | 3.626 | 3.626 | 3.626 | 3.626 | 3.626 | 3.626 |
| 8 | 3.261 | 3.399 | 3.475 | 3.549 | 3.56 | 3.575 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 | 3.579 |
| 9 | 3.199 | 3.339 | 3.420 | 3.502 | 3.523 | 3.536 | 3.544 | 3.544 | 3.547 | 3.547 | 3.547 | 3.547 | 3.547 | 3.547 | 3.547 | 3.547 |
| 10 | 3.151 | 3.293 | 3.376 | 3.465 | 3.489 | 3.505 | 3.516 | 3.516 | 3.522 | 3.526 | 3.526 | 3.526 | 3.526 | 3.526 | 3.526 | 3.526 |
| 11 | 3.113 | 3.256 | 3.342 | 3.397 | 3.435 | 3.462 | 3.480 | 3.493 | 3.501 | 3.509 | 3.510 | 3.510 | 3.510 | 3.510 | 3.510 | 3.510 |
| 12 | 3.082 | 3.225 | 3.313 | 3.370 | 3.410 | 3.439 | 3.459 | 3.474 | 3.484 | 3.496 | 3.499 | 3.499 | 3.499 | 3.499 | 3.499 | 3.499 |
| 13 | 3.055 | 3.200 | 3.289 | 3.348 | 3.389 | 3.419 | 3.442 | 3.458 | 3.470 | 3.484 | 3.490 | 3.490 | 3.490 | 3.490 | 3.490 | 3.490 |
| 14 | 3.033 | 3.178 | 3.268 | 3.329 | 3.372 | 3.403 | 3.426 | 3.444 | 3.457 | 3.474 | 3.482 | 3.484 | 3.485 | 3.485 | 3.485 | 3.485 |
| 15 | 3.014 | 3.160 | 3.250 | 3.312 | 3.356 | 3.389 | 3.413 | 3.432 | 3.446 | 3.465 | 3.476 | 3.480 | 3.481 | 3.481 | 3.481 | 3.481 |
| 16 | 2.998 | 3.144 | 3.235 | 3.298 | 3.343 | 3.376 | 3.402 | 3.422 | 3.437 | 3.458 | 3.470 | 3.477 | 3.478 | 3.478 | 3.478 | 3.478 |
| 17 | 2.984 | 3.130 | 3.222 | 3.285 | 3.331 | 3.366 | 3.392 | 3.412 | 3.429 | 3.451 | 3.465 | 3.473 | 3.476 | 3.476 | 3.476 | 3.476 |
| 18 | 2.971 | 3.118 | 3.210 | 3.274 | 3.321 | 3.356 | 3.383 | 3.405 | 3.421 | 3.445 | 3.460 | 3.470 | 3.474 | 3.474 | 3.474 | 3.474 |
| 19 | 2.960 | 3.107 | 3.199 | 3.264 | 3.311 | 3.347 | 3.375 | 3.397 | 3.415 | 3.440 | 3.456 | 3.467 | 3.472 | 3.474 | 3.474 | 3.474 |
| 20 | 2.950 | 3.097 | 3.190 | 3.255 | 3.303 | 3.339 | 3.368 | 3.391 | 3.409 | 3.436 | 3.453 | 3.464 | 3.470 | 3.473 | 3.474 | 3.474 |
| 24 | 2.919 | 3.066 | 3.160 | 3.226 | 3.276 | 3.315 | 3.345 | 3.370 | 3.390 | 3.420 | 3.441 | 3.456 | 3.465 | 3.471 | 3.475 | 3.477 |
| 30 | 2.888 | 3.035 | 3.131 | 3.199 | 3.250 | 3.290 | 3.322 | 3.349 | 3.371 | 3.405 | 3.430 | 3.447 | 3.460 | 3.470 | 3.477 | 3.486 |
| 40 | 2.858 | 3.006 | 3.102 | 3.171 | 3.224 | 3.266 | 3.300 | 3.328 | 3.352 | 3.390 | 3.418 | 3.439 | 3.456 | 3.469 | 3.479 | 3.504 |
| 60 | 2.829 | 2.976 | 3.073 | 3.143 | 3.198 | 3.241 | 3.277 | 3.307 | 3.333 | 3.374 | 3.406 | 3.431 | 3.451 | 3.467 | 3.481 | 3.537 |
| 120 | 2.800 | 2.947 | 2.045 | 3.116 | 3.172 | 3.217 | 3.254 | 3.287 | 3.314 | 3.359 | 3.394 | 3.423 | 3.446 | 3.466 | 3.483 | 3.691 |
| ∞ | 2.772 | 2.918 | 3.017 | 3.089 | 3.146 | 3.193 | 3.232 | 3.265 | 3.294 | 3.343 | 3.382 | 3.414 | 3.442 | 3.466 | 3.486 | 3.735 |

| df | $\alpha = .05$<br>Number of consecutive means ( p ) to be compared | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 100 |
| 1 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 | 90.03 |
| 2 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 |
| 3 | 8.261 | 8.231 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 | 8.321 |
| 4 | 6.512 | 6.677 | 6.740 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.756 | 6.76 |
| 5 | 5.702 | 5.893 | 5.989 | 6.040 | 6.065 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 | 6.074 |
| 6 | 5.243 | 5.439 | 5.549 | 5.614 | 5.655 | 5.680 | 5.694 | 5.701 | 5.703 | 5.703 | 5.703 | 5.703 | 5.703 | 5.703 | 5.703 | 5.703 |
| 7 | 4.949 | 5.145 | 5.260 | 5.334 | 5.383 | 5.416 | 5.439 | 5.454 | 5.464 | 5.472 | 5.472 | 5.472 | 5.472 | 5.472 | 5.472 | 5.472 |
| 8 | 4.746 | 4.939 | 5.057 | 5.135 | 5.189 | 5.227 | 5.256 | 5.276 | 5.291 | 5.309 | 5.316 | 5.317 | 5.317 | 5.317 | 5.317 | 5.317 |
| 9 | 4.596 | 4.787 | 4.906 | 4.986 | 5.043 | 5.086 | 5.118 | 5.142 | 5.160 | 5.185 | 5.199 | 5.205 | 5.206 | 5.206 | 5.206 | 5.206 |
| 10 | 4.482 | 4.671 | 4.790 | 4.871 | 4.931 | 4.975 | 5.010 | 5.037 | 5.058 | 5.088 | 5.106 | 5.117 | 5.122 | 5.124 | 5.124 | 5.124 |
| 11 | 4.392 | 4.579 | 4.697 | 4.780 | 4.841 | 4.887 | 4.924 | 4.952 | 4.975 | 5.009 | 5.031 | 5.045 | 5.054 | 5.059 | 5.061 | 5.061 |
| 12 | 4.320 | 4.504 | 4.622 | 4.706 | 4.767 | 4.815 | 4.852 | 4.883 | 4.907 | 4.944 | 4.969 | 4.986 | 4.998 | 5.066 | 5.010 | 5.011 |
| 13 | 4.260 | 4.442 | 4.560 | 4.644 | 4.706 | 4.755 | 4.793 | 4.824 | 4.850 | 4.889 | 4.917 | 4.937 | 4.950 | 4.960 | 4.966 | 4.972 |
| 14 | 4.210 | 4.391 | 4.508 | 4.591 | 4.654 | 4.704 | 4.743 | 4.775 | 4.802 | 4.843 | 4.872 | 4.894 | 4.910 | 4.921 | 4.929 | 4.940 |
| 15 | 4.168 | 4.347 | 4.463 | 4.547 | 4.610 | 4.660 | 4.700 | 4.733 | 4.760 | 4.803 | 4.834 | 4.857 | 4.874 | 4.887 | 4.897 | 4.914 |
| 16 | 4.131 | 4.309 | 4.425 | 4.509 | 4.572 | 4.622 | 4.663 | 4.696 | 4.724 | 4.768 | 4.800 | 4.825 | 4.844 | 4.858 | 4.869 | 4.892 |
| 17 | 4.099 | 4.275 | 4.391 | 4.475 | 4.539 | 4.589 | 4.620 | 4.664 | 4.693 | 4.738 | 4.771 | 4.797 | 4.816 | 4.832 | 4.844 | 4.874 |
| 18 | 4.071 | 4.246 | 4.362 | 4.445 | 4.509 | 4.560 | 4.601 | 4.635 | 4.664 | 4.711 | 4.745 | 4.772 | 4.792 | 4.808 | 4.821 | 4.858 |
| 19 | 4.046 | 4.220 | 4.335 | 4.419 | 4.483 | 4.534 | 4.575 | 4.610 | 4.639 | 4.686 | 4.722 | 4.749 | 4.771 | 4.788 | 4.802 | 4.845 |
| 20 | 4.024 | 4.197 | 4.312 | 4.395 | 4.459 | 4.510 | 4.552 | 4.587 | 4.617 | 4.664 | 4.701 | 4.729 | 4.751 | 4.769 | 4.786 | 4.833 |
| 24 | 3.956 | 4.126 | 4.239 | 4.322 | 4.386 | 4.437 | 4.480 | 4.516 | 4.546 | 4.596 | 4.634 | 4.665 | 4.690 | 4.710 | 4.727 | 4.802 |
| 30 | 3.889 | 4.056 | 4.168 | 4.250 | 4.314 | 4.366 | 4.409 | 4.445 | 4.477 | 4.528 | 4.569 | 4.601 | 4.628 | 4.650 | 4.669 | 4.777 |
| 40 | 3.825 | 3.988 | 4.098 | 4.180 | 4.244 | 4.296 | 4.339 | 4.376 | 4.408 | 4.461 | 4.503 | 4.537 | 4.566 | 4.591 | 4.611 | 4.764 |
| 60 | 3.762 | 3.922 | 4.031 | 4.111 | 4.174 | 4.226 | 4.270 | 4.307 | 4.340 | 4.394 | 4.438 | 4.474 | 4.504 | 4.530 | 4.552 | 4.765 |
| 120 | 3.702 | 3.858 | 3.965 | 4.044 | 4.107 | 4.158 | 4.202 | 4.239 | 4.272 | 4.327 | 4.372 | 4.410 | 4.442 | 4.469 | 4.494 | 4.770 |
| $\infty$ | 3.643 | 3.796 | 3.900 | 3.978 | 4.040 | 4.091 | 4.135 | 4.172 | 4.205 | 4.261 | 4.307 | 4.345 | 4.379 | 4.408 | 4.434 | 4.776 |

Table A-9a. Critical values [ t(α,k-1,df) ] to compare control against each of k-1 other treatments in one-sided Dunnett's tests.

| | α = .05 (k-1) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| df | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 5 | 2.02 | 2.44 | 2.68 | 2.85 | 2.98 | 3.08 | 3.16 | 3.24 | 3.30 |
| 6 | 1.94 | 2.34 | 2.56 | 2.71 | 2.83 | 2.92 | 3.00 | 3.07 | 3.12 |
| 7 | 1.89 | 2.27 | 2.48 | 3.62 | 2.73 | 2.82 | 2.89 | 2.95 | 3.01 |
| 8 | 1.86 | 2.22 | 2.42 | 2.55 | 2.66 | 2.74 | 2.81 | 2.87 | 2.92 |
| 9 | 1.83 | 2.18 | 2.37 | 2.50 | 2.60 | 2.68 | 2.75 | 2.81 | 2.86 |
| 10 | 1.81 | 2.15 | 2.34 | 2.47 | 2.56 | 2.64 | 2.70 | 2.76 | 2.81 |
| 11 | 1.80 | 2.13 | 2.31 | 2.44 | 2.53 | 2.60 | 2.67 | 2.72 | 2.77 |
| 12 | 1.78 | 2.11 | 2.29 | 2.41 | 2.50 | 2.58 | 2.64 | 2.69 | 2.74 |
| 13 | 1.77 | 2.09 | 2.27 | 2.39 | 2.48 | 2.55 | 2.61 | 2.65 | 2.71 |
| 14 | 1.76 | 2.08 | 2.25 | 2.37 | 2.46 | 2.53 | 2.59 | 2.64 | 2.69 |
| 16 | 1.75 | 2.06 | 2.23 | 2.34 | 2.43 | 2.50 | 2.56 | 2.61 | 2.65 |
| 18 | 1.73 | 2.04 | 2.21 | 2.32 | 2.41 | 2.48 | 2.53 | 2.58 | 2.62 |
| 20 | 1.72 | 2.03 | 2.19 | 2.30 | 2.39 | 2.46 | 2.51 | 2.56 | 2.60 |
| 30 | 1.70 | 1.99 | 2.15 | 2.25 | 2.33 | 2.40 | 2.45 | 2.50 | 2.54 |
| 60 | 1.67 | 1.95 | 2.10 | 2.21 | 2.28 | 2.35 | 2.39 | 2.44 | 2.48 |
| 120 | 1.66 | 1.93 | 2.08 | 2.18 | 2.26 | 2.32 | 2.37 | 2.41 | 2.45 |
| ∞ | 1.64 | 1.92 | 2.06 | 2.16 | 2.23 | 2.29 | 2.34 | 2.38 | 2.42 |

| | α = .01 (k-1) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| df | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 5 | 3.37 | 3.90 | 4.21 | 4.43 | 4.60 | 4.73 | 4.85 | 4.94 | 5.03 |
| 6 | 3.14 | 3.61 | 3.88 | 4.07 | 4.21 | 4.33 | 4.43 | 4.51 | 4.59 |
| 6 | 3.00 | 3.42 | 3.66 | 3.83 | 3.96 | 4.07 | 4.15 | 4.23 | 4.30 |
| 8 | 2.90 | 3.29 | 3.51 | 3.67 | 3.79 | 3.88 | 3.96 | 4.03 | 4.09 |
| 9 | 2.82 | 3.19 | 3.40 | 3.55 | 3.66 | 3.75 | 3.82 | 3.89 | 3.94 |
| 10 | 2.76 | 3.11 | 3.31 | 3.45 | 3.56 | 3.64 | 3.71 | 3.78 | 3.83 |
| 11 | 2.72 | 3.06 | 3.25 | 3.38 | 3.48 | 3.56 | 3.63 | 3.69 | 3.74 |
| 12 | 2.68 | 3.01 | 3.19 | 3.32 | 3.42 | 3.50 | 3.56 | 3.62 | 3.67 |
| 13 | 2.65 | 2.97 | 3.15 | 3.27 | 3.37 | 3.44 | 3.51 | 3.56 | 3.61 |
| 14 | 2.62 | 2.94 | 3.11 | 3.23 | 3.32 | 3.40 | 3.46 | 3.51 | 3.56 |
| 16 | 2.58 | 2.88 | 3.05 | 3.17 | 3.26 | 3.33 | 3.39 | 3.44 | 3.48 |
| 18 | 2.55 | 2.84 | 3.01 | 3.12 | 3.21 | 3.27 | 3.33 | 3.38 | 3.42 |
| 20 | 2.53 | 2.81 | 2.97 | 3.08 | 3.17 | 3.23 | 3.29 | 3.34 | 3.38 |
| 30 | 2.46 | 2.72 | 2.87 | 2.97 | 3.05 | 3.11 | 3.16 | 3.21 | 3.24 |
| 60 | 2.39 | 2.64 | 2.78 | 2.87 | 2.94 | 3.00 | 3.04 | 3.08 | 3.12 |
| 120 | 2.36 | 2.60 | 2.73 | 2.82 | 2.89 | 2.94 | 2.99 | 3.03 | 3.06 |
| ∞ | 2.33 | 2.56 | 2.68 | 2.77 | 2.84 | 2.89 | 2.93 | 2.97 | 3.00 |

Table A-9b. Critical values [ t(α, k-1, df) } to compare control against each of k-1 other treatments in two-sided Dunnett's tests.

α = .05

| | (k-1) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| df | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 20 |
| 5 | 2.57 | 3.03 | 3.29 | 3.48 | 3.62 | 3.73 | 3.82 | 3.90 | 4.03 | 4.42 |
| 6 | 2.45 | 2.86 | 3.10 | 3.26 | 3.39 | 3.49 | 3.57 | 3.64 | 3.76 | 4.11 |
| 7 | 2.36 | 2.75 | 2.97 | 3.12 | 3.24 | 3.33 | 3.41 | 3.47 | 3.58 | 3.91 |
| 8 | 2.31 | 2.67 | 2.88 | 3.02 | 3.13 | 3.22 | 3.29 | 3.35 | 3.46 | 3.76 |
| 9 | 2.26 | 2.61 | 2.81 | 2.95 | 3.05 | 3.14 | 3.20 | 3.26 | 3.36 | 3.65 |
| 10 | 2.23 | 2.57 | 2.76 | 2.89 | 2.99 | 3.07 | 3.14 | 3.19 | 3.29 | 3.57 |
| 11 | 2.20 | 2.53 | 2.72 | 2.84 | 2.94 | 3.02 | 3.08 | 3.14 | 3.23 | 3.50 |
| 12 | 2.18 | 2.50 | 2.68 | 2.81 | 2.90 | 3.98 | 3.04 | 3.09 | 3.18 | 3.45 |
| 13 | 2.16 | 2.48 | 2.65 | 2.78 | 2.87 | 2.94 | 3.00 | 3.06 | 3.14 | 3.40 |
| 14 | 2.14 | 2.46 | 2.63 | 2.75 | 2.84 | 2.91 | 2.97 | 3.02 | 3.11 | 3.36 |
| 16 | 2.12 | 2.42 | 2.59 | 2.71 | 2.80 | 2.87 | 2.92 | 2.97 | 3.06 | 3.30 |
| 18 | 2.10 | 2.40 | 2.56 | 2.68 | 2.76 | 2.83 | 2.89 | 2.94 | 3.01 | 3.25 |
| 20 | 2.09 | 2.38 | 2.54 | 2.65 | 2.73 | 2.80 | 2.86 | 2.90 | 2.98 | 3.22 |
| 30 | 2.04 | 2.32 | 2.47 | 2.58 | 2.66 | 2.72 | 2.77 | 2.82 | 2.89 | 3.11 |
| 60 | 2.00 | 2.27 | 2.41 | 2.51 | 2.58 | 2.64 | 2.69 | 2.73 | 2.80 | 3.00 |
| 120 | 1.98 | 2.24 | 2.38 | 2.47 | 2.55 | 2.60 | 2.65 | 2.69 | 2.76 | 2.95 |
| ∞ | 1.96 | 2.21 | 2.35 | 2.44 | 2.51 | 2.57 | 2.61 | 2.65 | 2.72 | 2.91 |

α = .01

| | (k-1) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| df | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 20 |
| 5 | 4.03 | 4.63 | 4.98 | 5.22 | 5.41 | 5.56 | 5.69 | 5.80 | 5.98 | 6.52 |
| 6 | 3.71 | 4.21 | 4.51 | 4.71 | 4.87 | 5.00 | 5.10 | 5.20 | 5.35 | 5.81 |
| 7 | 3.50 | 3.95 | 4.21 | 4.39 | 4.53 | 4.64 | 4.74 | 4.82 | 4.95 | 5.36 |
| 8 | 3.36 | 3.77 | 4.00 | 4.17 | 4.29 | 4.40 | 4.48 | 4.56 | 4.68 | 5.05 |
| 9 | 3.25 | 3.63 | 3.85 | 4.01 | 4.12 | 4.22 | 4.30 | 4.37 | 4.48 | 4.82 |
| 10 | 3.17 | 3.53 | 3.74 | 3.88 | 3.99 | 4.08 | 4.16 | 4.22 | 4.33 | 4.65 |
| 11 | 3.11 | 3.45 | 3.65 | 3.79 | 3.89 | 3.98 | 4.05 | 4.11 | 4.21 | 4.52 |
| 12 | 3.05 | 3.39 | 3.58 | 3.71 | 3.81 | 3.89 | 3.96 | 4.02 | 4.12 | 4.41 |
| 13 | 3.01 | 3.33 | 3.52 | 3.65 | 3.74 | 3.82 | 3.89 | 3.94 | 4.04 | 4.32 |
| 14 | 2.98 | 3.29 | 3.47 | 3.59 | 3.69 | 3.76 | 3.83 | 3.88 | 3.97 | 4.24 |
| 16 | 2.92 | 3.22 | 3.39 | 3.51 | 3.60 | 3.67 | 3.73 | 3.78 | 3.87 | 4.13 |
| 18 | 2.88 | 3.17 | 3.33 | 3.44 | 3.53 | 3.60 | 3.66 | 3.71 | 3.79 | 4.04 |
| 20 | 2.85 | 3.13 | 3.29 | 3.40 | 3.48 | 3.55 | 3.60 | 3.65 | 3.73 | 3.97 |
| 30 | 2.75 | 3.01 | 3.15 | 3.25 | 3.33 | 3.39 | 3.44 | 3.49 | 3.56 | 3.78 |
| 60 | 2.66 | 2.90 | 3.03 | 3.12 | 3.19 | 3.25 | 3.29 | 3.33 | 3.40 | 3.56 |
| 120 | 2.62 | 2.85 | 2.97 | 3.06 | 3.12 | 3.18 | 3.22 | 3.26 | 3.32 | 3.51 |
| ∞ | 2.58 | 2.79 | 2.92 | 3.00 | 3.06 | 3.11 | 3.15 | 3.19 | 3.25 | 3.42 |

Table A-10. Orthogonal coefficients for trend comparisons.

| k | polynomial | coefficients | | | | | | | | | $\Sigma c_{ij}^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Linear | -1 | 0 | 1 | | | | | | | 2 |
| | Quadratic | 1 | -2 | 1 | | | | | | | 6 |
| 4 | Linear | -3 | -1 | 1 | 3 | | | | | | 20 |
| | Quadratic | 1 | -1 | -1 | 1 | | | | | | 4 |
| | Cubic | -1 | 3 | -3 | 1 | | | | | | 20 |
| 5 | Linear | -2 | -1 | 0 | 1 | 2 | | | | | 10 |
| | Quadratic | 2 | -1 | -2 | -1 | 2 | | | | | 14 |
| | Cubic | -1 | 2 | 0 | -2 | 1 | | | | | 10 |
| | Quartic | 1 | -4 | 6 | -4 | 1 | | | | | 70 |
| 6 | Linear | -5 | -3 | -1 | 1 | 3 | 5 | | | | 70 |
| | Quadratic | 5 | -1 | -4 | -4 | -1 | 5 | | | | 84 |
| | Cubic | -5 | 7 | 4 | -4 | -7 | 5 | | | | 180 |
| | Quartic | 1 | -3 | 2 | 2 | -3 | 1 | | | | 28 |
| 7 | Linear | -3 | -2 | -1 | 0 | 1 | 2 | 3 | | | 28 |
| | Quadratic | 5 | 0 | -3 | -4 | -3 | 0 | 5 | | | 84 |
| | Cubic | -1 | 1 | 1 | 0 | -1 | -1 | 1 | | | 6 |
| | Quartic | 3 | -7 | 1 | 6 | 1 | -7 | 3 | | | 154 |
| 8 | Linear | -7 | -5 | -3 | -1 | 1 | 3 | 5 | 7 | | 168 |
| | Quadratic | 7 | 1 | -3 | -5 | -5 | -3 | 1 | 7 | | 168 |
| | Cubic | -7 | 5 | 7 | 3 | 3 | -7 | -5 | 7 | | 264 |
| | Quartic | 7 | -13 | -3 | 9 | 9 | -3 | -13 | 7 | | 616 |
| | Quintic | -7 | 23 | -17 | -15 | 15 | 17 | -23 | 7 | | 2184 |
| 9 | Linear | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 60 |
| | Quadratic | 28 | 7 | -8 | -17 | -20 | -17 | -8 | 7 | 28 | 2772 |
| | Cubic | -14 | 7 | 13 | 9 | 0 | -9 | -13 | -7 | 14 | 990 |
| | Quartic | 14 | -21 | -11 | 9 | 18 | 9 | -11 | -21 | 14 | 2002 |
| | Quintic | -4 | 11 | -4 | -9 | 0 | 9 | 4 | -11 | 4 | 468 |
| 10 | Linear | -9 | -7 | -5 | -3 | -1 | 1 | 3 | 5 | 7 | 9 | 330 |
| | Quadratic | 6 | 2 | -1 | -3 | -4 | -4 | -3 | -1 | 2 | 6 | 132 |
| | Cubic | -42 | 14 | 35 | 31 | 12 | -12 | -31 | -35 | -14 | 42 | 8580 |
| | Quartic | 18 | -22 | -17 | 3 | 18 | 18 | 3 | -17 | -22 | 18 | 2860 |
| | Quintic | -6 | 14 | -1 | -11 | -6 | 6 | 11 | 1 | -14 | 6 | 780 |

Table A-11. Critical values of the correlation coefficient for certain levels (.1, .05, .01, .001)of significance.

| df | .1 | .05 | .01 | .001 |
|---|---|---|---|---|
| 1 | .9879 | .9969 | .9999 | 1.0000 |
| 2 | .9000 | .9500 | .9900 | .9990 |
| 3 | .8054 | .8783 | .9587 | .9912 |
| 4 | .7293 | .8114 | .9172 | 9741 |
| 5 | .6694 | .7545 | .8745 | 9507 |
| 6 | .6215 | .7067 | .8343 | .9249 |
| 7 | .5822 | .6664 | .7977 | . 8082 |
| 8 | .5494 | .6319 | .7646 | . 8721 |
| 9 | .5214 | .6021 | .7348 | . 8471 |
| 10 | .4973 | .5760 | .7079 | . 8233 |
| 11 | .4762 | .5529 | .6835 | . 8010 |
| 12 | .4575 | .5324 | .6614 | . 7800 |
| 13 | .4409 | .5139 | .6411 | . 7603 |
| 14 | .4259 | .4973 | .6226 | . 7420 |
| 15 | .4124 | .4821 | .6055 | . 7246 |
| 16 | .4000 | .4683 | .5897 | . 7084 |
| 17 | .3887 | .4555 | .5751 | . 6932 |
| 18 | .3783 | .4439 | .5614 | . 6787 |
| 19 | .3687 | .4329 | .5487 | . 6653 |
| 20 | .3598 | .4227 | .5368 | . 6524 |
| 25 | .3233 | .38-9 | .4869 | . 5974 |
| 30 | .2960 | .3494 | .4487 | . 5541 |
| 35 | .2746 | .3246 | .4182 | . 5189 |
| 40 | .2573 | .3044 | .3932 | . 4896 |
| 45 | .2428 | .2875 | .3721 | . 4648 |
| 50 | .2306 | .2732 | .3541 | . 4433 |
| 60 | .2108 | .2500 | .3248 | . 4078 |
| 70 | .1954 | .2319 | .3017 | . 3799 |
| 80 | .1829 | .2172 | .2830 | . 3568 |
| 90 | .1726 | .2050 | .2673 | . 3375 |
| 100 | .1638 | .1946 | .2540 | . 3211 |