

Appendix

*T-Table: v = degrees of freedom for t -variable,
 Q = area under the curve right from the corresponding t -value,
 $2Q$ tests both right and left end of the total area under the curve.*

| v | $Q = 0.4$ $2Q = 0.8$ | 0.25 0.5 | 0.1 0.2 | 0.05 0.1 | 0.0,25 0.05 | 0.01 0.02 | 0.005 0.01 | 0.001 0.002 |
|----------|-------------------------|---------------------------|--------------------------|---------------------------|------------------------------|----------------------------|-----------------------------|------------------------------|
| 1 | 0.325 | 1.000 | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 | 318.31 |
| 2 | .289 | 0.816 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 22.326 |
| 3 | .277 | .765 | 1.638 | 2.353 | 3.182 | 4.547 | 5.841 | 10.213 |
| 4 | .171 | .741 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 7.173 |
| 5 | 0.267 | 0.727 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 5.893 |
| 6 | .265 | .718 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 5.208 |
| 7 | .263 | .711 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 4.785 |
| 8 | .262 | .706 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 4.501 |
| 9 | .261 | .703 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 4.297 |
| 10 | 0.261 | 0.700 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 4.144 |
| 11 | .269 | .697 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 4.025 |
| 12 | .269 | .695 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 3.930 |
| 13 | .259 | .694 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 3.852 |
| 14 | .258 | .692 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 3.787 |
| 15 | 0.258 | 0.691 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 3.733 |
| 16 | .258 | .690 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 3.686 |
| 17 | .257 | .689 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 3.646 |
| 18 | .257 | .688 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 3.610 |
| 19 | .257 | .688 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 3.579 |
| 20 | 0.257 | 0.687 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 3.552 |
| 21 | .257 | .686 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 3.527 |
| 22 | .256 | .686 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 3.505 |
| 23 | .256 | .685 | 1.319 | 1.714 | 2.069 | 2.600 | 2.807 | 3.485 |
| 24 | .256 | .685 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 | 3.467 |
| 25 | .256 | 0.684 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 | 3.450 |
| 26 | .256 | .654 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 | 3.435 |
| 27 | .256 | .684 | 1.314 | 1.701 | 2.052 | 2.473 | 2.771 | 3.421 |
| 28 | .256 | .683 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 | 3.408 |
| 29 | .256 | .683 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 | 3.396 |
| 30 | 0.256 | 0.683 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 | 3.385 |
| 40 | .255 | .681 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 | 3.307 |
| 60 | .254 | .679 | 1.296 | 1.671 | 2.000 | 2.390 | 2.660 | 3.232 |
| 120 | .254 | .677 | 1.289 | 1.658 | 1.950 | 2.358 | 2.617 | 3.160 |
| ∞ | .253 | .674 | 1.282 | 1.645 | 1.960 | 2.326 | 2.576 | 3.090 |

Chi-square distribution

| <i>df</i> | Two-tailed <i>P</i> -value | | | |
|-----------|----------------------------|--------|--------|--------|
| | 0.10 | 0.05 | 0.01 | 0.001 |
| 1 | 2.706 | 3.841 | 6.635 | 10.827 |
| 2 | 4.605 | 5.991 | 9.210 | 13.815 |
| 3 | 6.251 | 7.815 | 11.345 | 16.266 |
| 4 | 7.779 | 9.488 | 13.277 | 18.466 |
| 5 | 9.236 | 11.070 | 15.086 | 20.515 |
| 6 | 10.645 | 12.592 | 16.812 | 22.457 |
| 7 | 12.017 | 14.067 | 18.475 | 24.321 |
| 8 | 13.362 | 15.507 | 20.090 | 26.124 |
| 9 | 14.684 | 16.919 | 21.666 | 27.877 |
| 10 | 15.987 | 18.307 | 23.209 | 29.588 |
| 11 | 17.275 | 19.675 | 24.725 | 31.264 |
| 12 | 18.549 | 21.026 | 26.217 | 32.909 |
| 13 | 19.812 | 22.362 | 27.688 | 34.527 |
| 14 | 21.064 | 23.685 | 29.141 | 36.124 |
| 15 | 22.307 | 24.996 | 30.578 | 37.698 |
| 16 | 23.542 | 26.296 | 32.000 | 39.252 |
| 17 | 24.769 | 27.587 | 33.409 | 40.791 |
| 18 | 25.989 | 28.869 | 34.805 | 42.312 |
| 19 | 27.204 | 30.144 | 36.191 | 43.819 |
| 20 | 28.412 | 31.410 | 37.566 | 45.314 |
| 21 | 29.615 | 32.671 | 38.932 | 46.796 |
| 22 | 30.813 | 33.924 | 40.289 | 48.268 |
| 23 | 32.007 | 35.172 | 41.638 | 49.728 |
| 24 | 33.196 | 36.415 | 42.980 | 51.179 |
| 25 | 34.382 | 37.652 | 44.314 | 52.619 |
| 26 | 35.563 | 38.885 | 45.642 | 54.051 |
| 27 | 36.741 | 40.113 | 46.963 | 55.475 |
| 28 | 37.916 | 41.337 | 48.278 | 56.892 |
| 29 | 39.087 | 42.557 | 49.588 | 58.301 |
| 30 | 40.256 | 43.773 | 50.892 | 59.702 |
| 40 | 51.805 | 55.758 | 63.691 | 73.403 |
| 50 | 63.167 | 67.505 | 76.154 | 86.660 |
| 60 | 74.397 | 79.082 | 88.379 | 99.608 |
| 70 | 85.527 | 90.531 | 100.43 | 112.32 |
| 80 | 96.578 | 101.88 | 112.33 | 124.84 |
| 90 | 107.57 | 113.15 | 124.12 | 137.21 |
| 100 | 118.50 | 124.34 | 135.81 | 149.45 |

F-distribution

| df of denominator | 2-tailed P-value | 1-tailed P-value | Degrees of freedom (df) of the numerator | | | | | | | | | | | | |
|-------------------|------------------|------------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 25 | 500 |
| 1 | 0.05 | 0.025 | 647.8 | 799.5 | 864.2 | 899.6 | 921.8 | 937.1 | 948.2 | 956.6 | 963.3 | 968.6 | 984.9 | 998.1 | 1017.0 |
| 1 | 0.10 | 0.05 | 161.4 | 199.5 | 215.7 | 224.6 | 230.2 | 234.0 | 236.8 | 238.9 | 240.5 | 241.9 | 245.9 | 249.3 | 254.1 |
| 2 | 0.05 | 0.025 | 38.51 | 39.00 | 39.17 | 39.25 | 39.30 | 39.33 | 39.36 | 39.37 | 39.39 | 39.40 | 39.43 | 39.46 | 39.50 |
| 2 | 0.10 | 0.05 | 18.51 | 19.00 | 19.16 | 19.25 | 19.30 | 19.33 | 19.35 | 19.37 | 19.38 | 19.40 | 19.43 | 19.46 | 19.49 |
| 3 | 0.05 | 0.025 | 17.44 | 16.04 | 15.44 | 15.10 | 14.88 | 14.73 | 14.62 | 14.54 | 14.47 | 14.42 | 14.25 | 14.12 | 13.91 |
| 3 | 0.10 | 0.05 | 10.13 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 | 8.70 | 8.63 | 8.53 |
| 4 | 0.05 | 0.025 | 12.22 | 10.65 | 9.98 | 9.60 | 9.36 | 9.20 | 9.07 | 8.98 | 8.90 | 8.84 | 8.66 | 8.50 | 8.27 |
| 4 | 0.10 | 0.05 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 | 5.96 | 5.86 | 5.77 | 5.64 |
| 5 | 0.05 | 0.025 | 10.01 | 8.43 | 7.76 | 7.39 | 7.15 | 6.98 | 6.85 | 6.76 | 6.68 | 6.62 | 6.43 | 6.27 | 6.03 |
| 5 | 0.10 | 0.05 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 | 4.62 | 4.52 | 4.37 |
| 6 | 0.05 | 0.025 | 8.81 | 7.26 | 6.60 | 6.23 | 5.99 | 5.82 | 5.70 | 5.60 | 5.52 | 5.46 | 5.27 | 5.11 | 4.86 |
| 6 | 0.10 | 0.05 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 | 4.06 | 3.94 | 3.83 | 3.68 |
| 7 | 0.05 | 0.025 | 8.07 | 6.54 | 5.89 | 5.52 | 5.29 | 5.12 | 4.99 | 4.90 | 4.82 | 4.76 | 4.57 | 4.40 | 4.16 |
| 7 | 0.10 | 0.05 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 | 3.64 | 3.51 | 3.40 | 3.24 |
| 8 | 0.05 | 0.025 | 7.57 | 6.06 | 5.42 | 5.05 | 4.82 | 4.65 | 4.53 | 4.43 | 4.36 | 4.30 | 4.10 | 3.94 | 3.68 |
| 8 | 0.10 | 0.05 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 | 3.35 | 3.22 | 3.11 | 2.94 |
| 9 | 0.05 | 0.025 | 7.21 | 5.71 | 5.08 | 4.72 | 4.48 | 4.32 | 4.20 | 4.10 | 4.03 | 3.96 | 3.77 | 3.60 | 3.35 |
| 9 | 0.10 | 0.05 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 | 3.14 | 3.01 | 2.89 | 2.72 |
| 10 | 0.05 | 0.025 | 6.94 | 5.46 | 4.83 | 4.47 | 4.24 | 4.07 | 3.95 | 3.85 | 3.78 | 3.72 | 3.52 | 3.35 | 3.09 |
| 10 | 0.10 | 0.05 | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 | 2.85 | 2.73 | 2.55 |
| 15 | 0.05 | 0.025 | 6.20 | 4.77 | 4.15 | 3.80 | 3.58 | 3.41 | 3.29 | 3.20 | 3.12 | 3.06 | 2.86 | 2.69 | 2.41 |
| 15 | 0.10 | 0.05 | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 | 2.40 | 2.28 | 2.08 |
| 20 | 0.05 | 0.025 | 5.87 | 4.46 | 3.86 | 3.51 | 3.29 | 3.13 | 3.01 | 2.91 | 2.84 | 2.77 | 2.57 | 2.40 | 2.10 |
| 20 | 0.10 | 0.05 | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 | 2.35 | 2.20 | 2.07 | 1.86 |
| 30 | 0.05 | 0.025 | 5.57 | 4.18 | 3.59 | 3.25 | 3.03 | 2.87 | 2.75 | 2.65 | 2.57 | 2.51 | 2.31 | 2.12 | 1.81 |
| 30 | 0.10 | 0.05 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 | 2.01 | 1.88 | 1.64 |
| 50 | 0.05 | 0.025 | 5.34 | 3.97 | 3.39 | 3.05 | 2.83 | 2.67 | 2.55 | 2.46 | 2.38 | 2.32 | 2.11 | 1.92 | 1.57 |
| 50 | 0.10 | 0.05 | 4.03 | 3.18 | 2.79 | 2.56 | 2.40 | 2.29 | 2.20 | 2.13 | 2.07 | 2.03 | 1.87 | 1.73 | 1.46 |
| 100 | 0.05 | 0.025 | 5.18 | 3.83 | 3.25 | 2.92 | 2.70 | 2.54 | 2.42 | 2.32 | 2.24 | 2.18 | 1.97 | 1.77 | 1.38 |
| 100 | 0.10 | 0.05 | 3.94 | 3.09 | 2.70 | 2.46 | 2.31 | 2.19 | 2.10 | 2.03 | 1.97 | 1.93 | 1.77 | 1.62 | 1.31 |
| 1000 | 0.05 | 0.025 | 5.04 | 3.70 | 3.13 | 2.80 | 2.58 | 2.42 | 2.30 | 2.20 | 2.13 | 2.06 | 1.85 | 1.64 | 1.16 |
| 1000 | 0.10 | 0.05 | 3.85 | 3.00 | 2.61 | 2.38 | 2.22 | 2.11 | 2.02 | 1.95 | 1.89 | 1.84 | 1.68 | 1.52 | 1.13 |

Paired non-parametric test: Wilcoxon signed rank test, the table uses smaller of the two ranknumbers

| <i>N pairs</i> | <i>P < 0.05</i> | <i>P < 0.01</i> |
|-----------------------|---------------------------|---------------------------|
| 7 | 2 | 0 |
| 8 | 2 | 0 |
| 9 | 6 | 2 |
| 10 | 8 | 3 |
| 11 | 11 | 5 |
| 12 | 14 | 7 |
| 13 | 17 | 10 |
| 14 | 21 | 13 |
| 15 | 25 | 16 |
| 16 | 30 | 19 |

| n ¹ → | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------------|---|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| n ² ↓ 5 | | | | 15 | | | | | | | | | | |
| 6 | | | 10 | 16 | 23 | | | | | | | | | |
| 7 | | | 10 | 17 | 24 | 32 | | | | | | | | |
| 8 | | | 11 | 17 | 25 | 34 | 43 | | | | | | | |
| 9 | | 6 | 11 | 18 | 26 | 35 | 45 | 56 | | | | | | |
| 10 | | 6 | 12 | 19 | 27 | 37 | 47 | 58 | 71 | | | | | |
| 11 | | 6 | 12 | 20 | 28 | 38 | 49 | 61 | 74 | 87 | | | | |
| 12 | | 7 | 13 | 21 | 30 | 40 | 51 | 63 | 76 | 90 | 106 | | | |
| 13 | | 7 | 14 | 22 | 31 | 41 | 53 | 65 | 79 | 93 | 109 | 125 | | |
| 14 | | 7 | 14 | 22 | 32 | 43 | 54 | 67 | 81 | 96 | 112 | 129 | 147 | |
| 15 | | 8 | 15 | 23 | 33 | 44 | 56 | 70 | 84 | 99 | 115 | 133 | 151 | 171 |
| 16 | | 8 | 15 | 24 | 34 | 46 | 58 | 72 | 86 | 102 | 119 | 137 | 155 | |
| 17 | | 8 | 16 | 25 | 36 | 47 | 60 | 74 | 89 | 105 | 122 | 140 | | |
| 18 | | 8 | 16 | 26 | 37 | 49 | 62 | 76 | 92 | 108 | 125 | | | |
| 19 | 3 | 9 | 17 | 27 | 38 | 50 | 64 | 78 | 94 | 111 | | | | |
| 20 | 3 | 9 | 18 | 28 | 39 | 52 | 66 | 81 | 97 | | | | | |
| 21 | 3 | 9 | 18 | 29 | 40 | 53 | 68 | 83 | | | | | | |
| 22 | 3 | 10 | 19 | 29 | 42 | 55 | 70 | | | | | | | |
| 23 | 3 | 10 | 19 | 30 | 43 | 57 | | | | | | | | |
| 24 | 3 | 10 | 20 | 31 | 44 | | | | | | | | | |
| 25 | 3 | 11 | 20 | 32 | | | | | | | | | | |
| 26 | 3 | 11 | 21 | | | | | | | | | | | |
| 27 | 4 | 11 | | | | | | | | | | | | |
| 28 | 4 | | | | | | | | | | | | | |

Unpaired non-parametric test: Mann-Whitney test. Table uses difference of added up rank numbers between group 1 and group 2.

| n ¹ → | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------------|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| n ² ↓ 4 | | | 10 | | | | | | | | | | | |
| 5 | | 6 | 11 | 17 | | | | | | | | | | |
| 6 | | 7 | 12 | 18 | 26 | | | | | | | | | |
| 7 | | 7 | 13 | 20 | 27 | 36 | | | | | | | | |
| 8 | 3 | 8 | 14 | 21 | 29 | 38 | 49 | | | | | | | |
| 9 | 3 | 8 | 15 | 22 | 31 | 40 | 51 | 63 | | | | | | |
| 10 | 3 | 9 | 15 | 23 | 32 | 42 | 53 | 62 | 78 | | | | | |
| 11 | 4 | 9 | 16 | 24 | 34 | 44 | 55 | 68 | 81 | 96 | | | | |
| 12 | 4 | 10 | 17 | 26 | 35 | 46 | 58 | 71 | 85 | 99 | 115 | | | |
| 13 | 4 | 10 | 18 | 27 | 37 | 48 | 60 | 73 | 88 | 103 | 119 | 137 | | |
| 14 | 4 | 11 | 19 | 28 | 38 | 50 | 63 | 76 | 91 | 106 | 123 | 141 | 160 | |
| 15 | 4 | 11 | 20 | 29 | 40 | 52 | 65 | 79 | 94 | 110 | 127 | 145 | 164 | 185 |
| 16 | 4 | 12 | 21 | 31 | 42 | 54 | 67 | 82 | 97 | 114 | 131 | 150 | 169 | |
| 17 | 5 | 12 | 21 | 32 | 43 | 56 | 70 | 84 | 100 | 117 | 135 | 154 | | |
| 18 | 5 | 13 | 22 | 33 | 45 | 58 | 72 | 87 | 103 | 121 | 139 | | | |
| 19 | 5 | 13 | 23 | 34 | 46 | 60 | 74 | 90 | 107 | 124 | | | | |
| 20 | 5 | 14 | 24 | 35 | 48 | 62 | 77 | 93 | 110 | | | | | |
| 21 | 6 | 14 | 25 | 37 | 50 | 64 | 79 | 95 | | | | | | |
| 22 | 6 | 15 | 26 | 38 | 51 | 66 | 82 | | | | | | | |
| 23 | 6 | 15 | 27 | 39 | 53 | 68 | | | | | | | | |
| 24 | 6 | 16 | 28 | 40 | 55 | | | | | | | | | |
| 25 | 6 | 16 | 28 | 42 | | | | | | | | | | |
| 26 | 7 | 17 | 29 | | | | | | | | | | | |
| 27 | 7 | 17 | | | | | | | | | | | | |
| 28 | 7 | | | | | | | | | | | | | |

Unpaired non-parametric test: Mann-Whitney test. Table uses difference of added up rank numbers between group 1 and group 2.