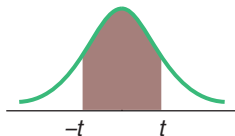
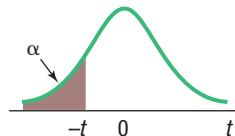


# Appendix B

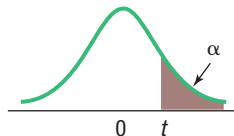
## B.2 Student's *t* Distribution



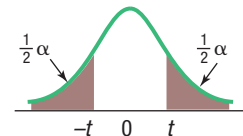
Confidence interval



Left-tailed test



Right-tailed test



Two-tailed test

(continued)

| Confidence Intervals, <i>c</i>                      |                                                     |       |        |        |        |         |
|-----------------------------------------------------|-----------------------------------------------------|-------|--------|--------|--------|---------|
| <i>df</i><br>(degrees<br>of<br>freedom)             | 80%                                                 | 90%   | 95%    | 98%    | 99%    | 99.9%   |
|                                                     | Level of Significance for One-Tailed Test, $\alpha$ |       |        |        |        |         |
|                                                     | 0.100                                               | 0.050 | 0.025  | 0.010  | 0.005  | 0.0005  |
| Level of Significance for Two-Tailed Test, $\alpha$ |                                                     |       |        |        |        |         |
|                                                     | 0.200                                               | 0.10  | 0.05   | 0.02   | 0.01   | 0.001   |
| 1                                                   | 3.078                                               | 6.314 | 12.706 | 31.821 | 63.657 | 636.619 |
| 2                                                   | 1.886                                               | 2.920 | 4.303  | 6.965  | 9.925  | 31.599  |
| 3                                                   | 1.638                                               | 2.353 | 3.182  | 4.541  | 5.841  | 12.924  |
| 4                                                   | 1.533                                               | 2.132 | 2.776  | 3.747  | 4.604  | 8.610   |
| 5                                                   | 1.476                                               | 2.015 | 2.571  | 3.365  | 4.032  | 6.869   |
| 6                                                   | 1.440                                               | 1.943 | 2.447  | 3.143  | 3.707  | 5.959   |
| 7                                                   | 1.415                                               | 1.895 | 2.365  | 2.998  | 3.499  | 5.408   |
| 8                                                   | 1.397                                               | 1.860 | 2.306  | 2.896  | 3.355  | 5.041   |
| 9                                                   | 1.383                                               | 1.833 | 2.262  | 2.821  | 3.250  | 4.781   |
| 10                                                  | 1.372                                               | 1.812 | 2.228  | 2.764  | 3.169  | 4.587   |
| 11                                                  | 1.363                                               | 1.796 | 2.201  | 2.718  | 3.106  | 4.437   |
| 12                                                  | 1.356                                               | 1.782 | 2.179  | 2.681  | 3.055  | 4.318   |
| 13                                                  | 1.350                                               | 1.771 | 2.160  | 2.650  | 3.012  | 4.221   |
| 14                                                  | 1.345                                               | 1.761 | 2.145  | 2.624  | 2.977  | 4.140   |
| 15                                                  | 1.341                                               | 1.753 | 2.131  | 2.602  | 2.947  | 4.073   |
| 16                                                  | 1.337                                               | 1.746 | 2.120  | 2.583  | 2.921  | 4.015   |
| 17                                                  | 1.333                                               | 1.740 | 2.110  | 2.567  | 2.898  | 3.965   |
| 18                                                  | 1.330                                               | 1.734 | 2.101  | 2.552  | 2.878  | 3.922   |
| 19                                                  | 1.328                                               | 1.729 | 2.093  | 2.539  | 2.861  | 3.883   |
| 20                                                  | 1.325                                               | 1.725 | 2.086  | 2.528  | 2.845  | 3.850   |
| 21                                                  | 1.323                                               | 1.721 | 2.080  | 2.518  | 2.831  | 3.819   |
| 22                                                  | 1.321                                               | 1.717 | 2.074  | 2.508  | 2.819  | 3.792   |
| 23                                                  | 1.319                                               | 1.714 | 2.069  | 2.500  | 2.807  | 3.768   |
| 24                                                  | 1.318                                               | 1.711 | 2.064  | 2.492  | 2.797  | 3.745   |
| 25                                                  | 1.316                                               | 1.708 | 2.060  | 2.485  | 2.787  | 3.725   |
| 26                                                  | 1.315                                               | 1.706 | 2.056  | 2.479  | 2.779  | 3.707   |
| 27                                                  | 1.314                                               | 1.703 | 2.052  | 2.473  | 2.771  | 3.690   |
| 28                                                  | 1.313                                               | 1.701 | 2.048  | 2.467  | 2.763  | 3.674   |
| 29                                                  | 1.311                                               | 1.699 | 2.045  | 2.462  | 2.756  | 3.659   |
| 30                                                  | 1.310                                               | 1.697 | 2.042  | 2.457  | 2.750  | 3.646   |
| 31                                                  | 1.309                                               | 1.696 | 2.040  | 2.453  | 2.744  | 3.633   |
| 32                                                  | 1.309                                               | 1.694 | 2.037  | 2.449  | 2.738  | 3.622   |
| 33                                                  | 1.308                                               | 1.692 | 2.035  | 2.445  | 2.733  | 3.611   |
| 34                                                  | 1.307                                               | 1.691 | 2.032  | 2.441  | 2.728  | 3.601   |
| 35                                                  | 1.306                                               | 1.690 | 2.030  | 2.438  | 2.724  | 3.591   |

(continued-top right)

| Confidence Intervals, <i>c</i>                      |                                                     |       |       |       |       |        |
|-----------------------------------------------------|-----------------------------------------------------|-------|-------|-------|-------|--------|
| <i>df</i><br>(degrees<br>of<br>freedom)             | 80%                                                 | 90%   | 95%   | 98%   | 99%   | 99.9%  |
|                                                     | Level of Significance for One-Tailed Test, $\alpha$ |       |       |       |       |        |
|                                                     | 0.100                                               | 0.050 | 0.025 | 0.010 | 0.005 | 0.0005 |
| Level of Significance for Two-Tailed Test, $\alpha$ |                                                     |       |       |       |       |        |
|                                                     | 0.200                                               | 0.10  | 0.05  | 0.02  | 0.01  | 0.001  |
| 36                                                  | 1.306                                               | 1.688 | 2.028 | 2.434 | 2.719 | 3.582  |
| 37                                                  | 1.305                                               | 1.687 | 2.026 | 2.431 | 2.715 | 3.574  |
| 38                                                  | 1.304                                               | 1.686 | 2.024 | 2.429 | 2.712 | 3.566  |
| 39                                                  | 1.304                                               | 1.685 | 2.023 | 2.426 | 2.708 | 3.558  |
| 40                                                  | 1.303                                               | 1.684 | 2.021 | 2.423 | 2.704 | 3.551  |
| 41                                                  | 1.303                                               | 1.683 | 2.020 | 2.421 | 2.701 | 3.544  |
| 42                                                  | 1.302                                               | 1.682 | 2.018 | 2.418 | 2.698 | 3.538  |
| 43                                                  | 1.302                                               | 1.681 | 2.017 | 2.416 | 2.695 | 3.532  |
| 44                                                  | 1.301                                               | 1.680 | 2.015 | 2.414 | 2.692 | 3.526  |
| 45                                                  | 1.301                                               | 1.679 | 2.014 | 2.412 | 2.690 | 3.520  |
| 46                                                  | 1.300                                               | 1.679 | 2.013 | 2.410 | 2.687 | 3.515  |
| 47                                                  | 1.300                                               | 1.678 | 2.012 | 2.408 | 2.685 | 3.510  |
| 48                                                  | 1.299                                               | 1.677 | 2.011 | 2.407 | 2.682 | 3.505  |
| 49                                                  | 1.299                                               | 1.677 | 2.010 | 2.405 | 2.680 | 3.500  |
| 50                                                  | 1.299                                               | 1.676 | 2.009 | 2.403 | 2.678 | 3.496  |
| 51                                                  | 1.298                                               | 1.675 | 2.008 | 2.402 | 2.676 | 3.492  |
| 52                                                  | 1.298                                               | 1.675 | 2.007 | 2.400 | 2.674 | 3.488  |
| 53                                                  | 1.298                                               | 1.674 | 2.006 | 2.399 | 2.672 | 3.484  |
| 54                                                  | 1.297                                               | 1.674 | 2.005 | 2.397 | 2.670 | 3.480  |
| 55                                                  | 1.297                                               | 1.673 | 2.004 | 2.396 | 2.668 | 3.476  |
| 56                                                  | 1.297                                               | 1.673 | 2.003 | 2.395 | 2.667 | 3.473  |
| 57                                                  | 1.297                                               | 1.672 | 2.002 | 2.394 | 2.665 | 3.470  |
| 58                                                  | 1.296                                               | 1.672 | 2.002 | 2.392 | 2.663 | 3.466  |
| 59                                                  | 1.296                                               | 1.671 | 2.001 | 2.391 | 2.662 | 3.463  |
| 60                                                  | 1.296                                               | 1.671 | 2.000 | 2.390 | 2.660 | 3.460  |
| 61                                                  | 1.296                                               | 1.670 | 2.000 | 2.389 | 2.659 | 3.457  |
| 62                                                  | 1.295                                               | 1.670 | 1.999 | 2.388 | 2.657 | 3.454  |
| 63                                                  | 1.295                                               | 1.669 | 1.998 | 2.387 | 2.656 | 3.452  |
| 64                                                  | 1.295                                               | 1.669 | 1.998 | 2.386 | 2.655 | 3.449  |
| 65                                                  | 1.295                                               | 1.669 | 1.997 | 2.385 | 2.654 | 3.447  |
| 66                                                  | 1.295                                               | 1.668 | 1.997 | 2.384 | 2.652 | 3.444  |
| 67                                                  | 1.294                                               | 1.668 | 1.996 | 2.383 | 2.651 | 3.442  |
| 68                                                  | 1.294                                               | 1.668 | 1.995 | 2.382 | 2.650 | 3.439  |
| 69                                                  | 1.294                                               | 1.667 | 1.995 | 2.382 | 2.649 | 3.437  |
| 70                                                  | 1.294                                               | 1.667 | 1.994 | 2.381 | 2.648 | 3.435  |

(continued)

# Appendix B

## B.2 Student's *t* Distribution (*concluded*)

(continued)

| <i>df</i><br>(degrees<br>of<br>freedom)             | Confidence Intervals, <i>c</i>                      |       |       |       |       |        |
|-----------------------------------------------------|-----------------------------------------------------|-------|-------|-------|-------|--------|
|                                                     | 80%                                                 | 90%   | 95%   | 98%   | 99%   | 99.9%  |
|                                                     | Level of Significance for One-Tailed Test, $\alpha$ |       |       |       |       |        |
|                                                     | 0.100                                               | 0.050 | 0.025 | 0.010 | 0.005 | 0.0005 |
| Level of Significance for Two-Tailed Test, $\alpha$ |                                                     |       |       |       |       |        |
| 0.200                                               | 0.10                                                | 0.05  | 0.02  | 0.01  | 0.001 |        |
| 71                                                  | 1.294                                               | 1.667 | 1.994 | 2.380 | 2.647 | 3.433  |
| 72                                                  | 1.293                                               | 1.666 | 1.993 | 2.379 | 2.646 | 3.431  |
| 73                                                  | 1.293                                               | 1.666 | 1.993 | 2.379 | 2.645 | 3.429  |
| 74                                                  | 1.293                                               | 1.666 | 1.993 | 2.378 | 2.644 | 3.427  |
| 75                                                  | 1.293                                               | 1.665 | 1.992 | 2.377 | 2.643 | 3.425  |
| 76                                                  | 1.293                                               | 1.665 | 1.992 | 2.376 | 2.642 | 3.423  |
| 77                                                  | 1.293                                               | 1.665 | 1.991 | 2.376 | 2.641 | 3.421  |
| 78                                                  | 1.292                                               | 1.665 | 1.991 | 2.375 | 2.640 | 3.420  |
| 79                                                  | 1.292                                               | 1.664 | 1.990 | 2.374 | 2.640 | 3.418  |
| 80                                                  | 1.292                                               | 1.664 | 1.990 | 2.374 | 2.639 | 3.416  |
| 81                                                  | 1.292                                               | 1.664 | 1.990 | 2.373 | 2.638 | 3.415  |
| 82                                                  | 1.292                                               | 1.664 | 1.989 | 2.373 | 2.637 | 3.413  |
| 83                                                  | 1.292                                               | 1.663 | 1.989 | 2.372 | 2.636 | 3.412  |
| 84                                                  | 1.292                                               | 1.663 | 1.989 | 2.372 | 2.636 | 3.410  |
| 85                                                  | 1.292                                               | 1.663 | 1.988 | 2.371 | 2.635 | 3.409  |
| 86                                                  | 1.291                                               | 1.663 | 1.988 | 2.370 | 2.634 | 3.407  |
| 87                                                  | 1.291                                               | 1.663 | 1.988 | 2.370 | 2.634 | 3.406  |
| 88                                                  | 1.291                                               | 1.662 | 1.987 | 2.369 | 2.633 | 3.405  |
| 89                                                  | 1.291                                               | 1.662 | 1.987 | 2.369 | 2.632 | 3.403  |
| 90                                                  | 1.291                                               | 1.662 | 1.987 | 2.368 | 2.632 | 3.402  |
| 91                                                  | 1.291                                               | 1.662 | 1.986 | 2.368 | 2.631 | 3.401  |
| 92                                                  | 1.291                                               | 1.662 | 1.986 | 2.368 | 2.630 | 3.399  |
| 93                                                  | 1.291                                               | 1.661 | 1.986 | 2.367 | 2.630 | 3.398  |
| 94                                                  | 1.291                                               | 1.661 | 1.986 | 2.367 | 2.629 | 3.397  |
| 95                                                  | 1.291                                               | 1.661 | 1.985 | 2.366 | 2.629 | 3.396  |
| 96                                                  | 1.290                                               | 1.661 | 1.985 | 2.366 | 2.628 | 3.395  |
| 97                                                  | 1.290                                               | 1.661 | 1.985 | 2.365 | 2.627 | 3.394  |
| 98                                                  | 1.290                                               | 1.661 | 1.984 | 2.365 | 2.627 | 3.393  |
| 99                                                  | 1.290                                               | 1.660 | 1.984 | 2.365 | 2.626 | 3.392  |
| 100                                                 | 1.290                                               | 1.660 | 1.984 | 2.364 | 2.626 | 3.390  |
| 120                                                 | 1.289                                               | 1.658 | 1.980 | 2.358 | 2.617 | 3.373  |
| 140                                                 | 1.288                                               | 1.656 | 1.977 | 2.353 | 2.611 | 3.361  |
| 160                                                 | 1.287                                               | 1.654 | 1.975 | 2.350 | 2.607 | 3.352  |
| 180                                                 | 1.286                                               | 1.653 | 1.973 | 2.347 | 2.603 | 3.345  |
| 200                                                 | 1.286                                               | 1.653 | 1.972 | 2.345 | 2.601 | 3.340  |
| $\infty$                                            | 1.282                                               | 1.645 | 1.960 | 2.326 | 2.576 | 3.291  |