Show Your Work for Full Credit

[1](5) Assume that we collect a large (*n* > 30) simple random sample of annual incomes of adults in the United States. Because the sample is large, can we approximate the distribution of these incomes with a normal distribution? Why or why not? Explain.

[2](12) Answer the following briefly:

1. What is the purpose of constructing a normal probability plot?
2. If we select a simple random sample of M&M plain candies and construct a normal probability plot of their weights, what pattern would we expect in the plot?
3. Assume that we collect a data set of ages of all San Francisco City Police officers. Examining a histogram and normal probability plot are two different ways to assess the normality of that data set. Identify a third way.

[3](15) An important issue facing Americans is the large number of medical malpractice lawsuits and the expenses that they generate. In a study of 1228 randomly selected medical malpractice lawsuits, it is found that 856 of them were later dropped or dismissed (based on data from the Physician Insurers Association of America).

1. What is the best point estimate of the proportion of medical malpractice lawsuits that are dropped or dismissed
2. Construct a 98% confidence interval estimate of the proportion of medical malpractice lawsuits that are dropped or dismissed?
3. Does it appear that the majority of such suits are dropped or dismissed?
4. To determine whether the majority of such suits are dropped or dismissed, we perform a hypothesis test. What are the null hypothesis and alternative hypothesis?

*H*0 (null hypothesis):

*H*1 (alternative hypothesis):

1. Using a significance level corresponding to the confidence level used in (b), test the claim that the majority of such suits are dropped or dismissed.

[4](10) Many people believe that criminal who plead guilty tend to get lighter sentences than those who are convicted in trials. Used a 0.05 significance level, a hypothesis test was conducted to test the claim that the sentence (sent to prison or not sent to prison) is independent of the plea. The accompanying input and output table below summarizes such a case using randomly selected sample data from San Francisco defendants in burglary cases (Brereton and Casper, *Law and Society Review*, Vol. 16, No. 1). All the subjects had prior prison sentences.

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Based on the printout (some parts of printout were not shown), answer the following:

1. What are the null hypothesis and alternative hypothesis used for the test? Be specific.

*H*0 (null hypothesis):

*H*1 (alternative hypothesis):

1. At the 0.05 level of significance, is there evidence of a significant relationship between “sent to prison” and “guilty plea”?
2. If you were an attorney defending a guilty defendant, would these results suggest that you encourage a guilty plea?

[5](18) In a presidential election, 308 out of 611 voters surveyed said that they voted for the candidate who won (based on data from ICR Survey Research Group). Using a 0.01 significance level, we want to test the claim that among all voters, the percentage who believe that they voted for the winning candidate is equal to 43%, which is the actual percentage of voters for the winning candidate.

1. State the null and alternative hypotheses.

*H*0 (null hypothesis):

*H*1 (alternative hypothesis):

1. Select the distribution (*Z*-distribution or *t*-distribution) to use. Explain briefly why you selected it.
2. Determine the rejection and non-rejection regions based on your hypotheses in (a). State the critical value.
3. Calculate the value of the test statistic.
4. Based on the results of (c) and (d), what do they suggest about claim that among all voters, the percentage who believe that they voted for the winning candidate is equal to 43%? Explain your conclusion in words.
5. Based on these results, does it appear that accurate voting results can be obtained by asking voters how they voted?

[6](40) Listed below are the overhead width (in cm) of seals measured from photographs and the weights (in kg) of the seals) based on “Mass Estimation of Weddell Seals Using Techniques of Photogrammetry,” by R. Garrott of Montana State University.) The purpose of the study was to determine if weights of seals could be determined from overhead photographs.

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| Overhead Width | 7.2 | 7.4 | 9.8 | 9.4 | 8.8 | 8.4 |
| Weight | 116 | 154 | 245 | 202 | 200 | 191 |

We run regression analysis and obtain the following printouts from Excel. Use them as needed to answer the following questions.

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|  | The scatter plot as X = Overhead width of a seal (in cm) and Y = Weight (in kg). |
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|  | Normal Probability Plot for residuals. |

1. At the 0.05 level of significance, is there evidence of a linear relationship between the overhead widths of seals from photographs and the weights of the seals? Make sure to state the null and alternative hypotheses clearly.
2. Perform the residual analysis (LINE analysis), that is, evaluate whether the assumptions of regression have been seriously violated.

Linearity:

Independence of errors:

Normality of error:

Equal variance:

1. Assuming that all conditions for regression are satisfied (whether or not this is shown in b)), write the regression equation.
2. Test whether 1 (the population slope) is equal to 0 at the 0.05 level of significance. Make sure to state the null and alternative hypotheses clearly.
3. Interpret the meaning of the slope in this model.
4. Interpret the meaning of the intercept in this model. Will this value make sense to the data?
5. Determine the standard error of estimate.
6. Determine the coefficient of determination (*r*2) and interpret its meaning.
7. Find the best predicted weight (in kg) of a seal if the overhead width measured from the photograph is 9.0 cm.
8. Find the total sum of squares *SST*.

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| **Entry represents area under the cumulative standard normal distribution from - to Z** |
| **Z** | **0.00** | **0.01** | **0.02** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
| **-4.00** | 0.000032 | 0.000030 | 0.000029 | 0.000028 | 0.000027 | 0.000026 | 0.000025 | 0.000024 | 0.000023 | 0.000022 |
| **-3.90** | 0.000048 | 0.000046 | 0.000044 | 0.000042 | 0.000041 | 0.000039 | 0.000037 | 0.000036 | 0.000034 | 0.000033 |
| **-3.80** | 0.000072 | 0.000069 | 0.000067 | 0.000064 | 0.000062 | 0.000059 | 0.000057 | 0.000054 | 0.000052 | 0.000050 |
| **-3.70** | 0.000108 | 0.000104 | 0.000100 | 0.000096 | 0.000092 | 0.000088 | 0.000085 | 0.000082 | 0.000078 | 0.000075 |
| **-3.60** | 0.000159 | 0.000153 | 0.000147 | 0.000142 | 0.000136 | 0.000131 | 0.000126 | 0.000121 | 0.000117 | 0.000112 |
| **-3.50** | 0.000233 | 0.000224 | 0.000216 | 0.000208 | 0.000200 | 0.000193 | 0.000185 | 0.000178 | 0.000172 | 0.000165 |
| **-3.40** | 0.000337 | 0.000325 | 0.000313 | 0.000302 | 0.000291 | 0.000280 | 0.000270 | 0.000260 | 0.000251 | 0.000242 |
| **-3.30** | 0.000483 | 0.000466 | 0.000450 | 0.000434 | 0.000419 | 0.000404 | 0.000390 | 0.000376 | 0.000362 | 0.000349 |
| **-3.20** | 0.000687 | 0.000664 | 0.000641 | 0.000619 | 0.000598 | 0.000577 | 0.000557 | 0.000538 | 0.000519 | 0.000501 |
| **-3.10** | 0.000968 | 0.000935 | 0.000904 | 0.000874 | 0.000845 | 0.000816 | 0.000789 | 0.000762 | 0.000736 | 0.000711 |
| **-3.00** | 0.001350 | 0.001306 | 0.001264 | 0.001223 | 0.001183 | 0.001144 | 0.001107 | 0.001070 | 0.001035 | 0.001001 |
| **-2.90** | 0.001866 | 0.001807 | 0.001750 | 0.001695 | 0.001641 | 0.001589 | 0.001538 | 0.001489 | 0.001441 | 0.001395 |
| **-2.80** | 0.002555 | 0.002477 | 0.002401 | 0.002327 | 0.002256 | 0.002186 | 0.002118 | 0.002052 | 0.001988 | 0.001926 |
| **-2.70** | 0.003467 | 0.003364 | 0.003264 | 0.003167 | 0.003072 | 0.002980 | 0.002890 | 0.002803 | 0.002718 | 0.002635 |
| **-2.60** | 0.004661 | 0.004527 | 0.004396 | 0.004269 | 0.004145 | 0.004025 | 0.003907 | 0.003793 | 0.003681 | 0.003573 |
| **-2.50** | 0.006210 | 0.006037 | 0.005868 | 0.005703 | 0.005543 | 0.005386 | 0.005234 | 0.005085 | 0.004940 | 0.004799 |
| **-2.40** | 0.008198 | 0.007976 | 0.007760 | 0.007549 | 0.007344 | 0.007143 | 0.006947 | 0.006756 | 0.006569 | 0.006387 |
| **-2.30** | 0.010724 | 0.010444 | 0.010170 | 0.009903 | 0.009642 | 0.009387 | 0.009137 | 0.008894 | 0.008656 | 0.008424 |
| **-2.20** | 0.013903 | 0.013553 | 0.013209 | 0.012874 | 0.012545 | 0.012224 | 0.011911 | 0.011604 | 0.011304 | 0.011011 |
| **-2.10** | 0.017864 | 0.017429 | 0.017003 | 0.016586 | 0.016177 | 0.015778 | 0.015386 | 0.015003 | 0.014629 | 0.014262 |
| **-2.00** | 0.022750 | 0.022216 | 0.021692 | 0.021178 | 0.020675 | 0.020182 | 0.019699 | 0.019226 | 0.018763 | 0.018309 |
| **-1.90** | 0.028717 | 0.028067 | 0.027429 | 0.026803 | 0.026190 | 0.025588 | 0.024998 | 0.024419 | 0.023852 | 0.023295 |
| **-1.80** | 0.035930 | 0.035148 | 0.034380 | 0.033625 | 0.032884 | 0.032157 | 0.031443 | 0.030742 | 0.030054 | 0.029379 |
| **-1.70** | 0.044565 | 0.043633 | 0.042716 | 0.041815 | 0.040930 | 0.040059 | 0.039204 | 0.038364 | 0.037538 | 0.036727 |
| **-1.60** | 0.054799 | 0.053699 | 0.052616 | 0.051551 | 0.050503 | 0.049471 | 0.048457 | 0.047460 | 0.046479 | 0.045514 |
| **-1.50** | 0.066807 | 0.065522 | 0.064255 | 0.063008 | 0.061780 | 0.060571 | 0.059380 | 0.058208 | 0.057053 | 0.055917 |
| **-1.40** | 0.080757 | 0.079270 | 0.077804 | 0.076359 | 0.074934 | 0.073529 | 0.072145 | 0.070781 | 0.069437 | 0.068112 |
| **-1.30** | 0.096800 | 0.095098 | 0.093418 | 0.091759 | 0.090123 | 0.088508 | 0.086915 | 0.085343 | 0.083793 | 0.082264 |
| **-1.20** | 0.115070 | 0.113139 | 0.111232 | 0.109349 | 0.107488 | 0.105650 | 0.103835 | 0.102042 | 0.100273 | 0.098525 |
| **-1.10** | 0.135666 | 0.133500 | 0.131357 | 0.129238 | 0.127143 | 0.125072 | 0.123024 | 0.121000 | 0.119000 | 0.117023 |
| **-1.00** | 0.158655 | 0.156248 | 0.153864 | 0.151505 | 0.149170 | 0.146859 | 0.144572 | 0.142310 | 0.140071 | 0.137857 |
| **-0.90** | 0.184060 | 0.181411 | 0.178786 | 0.176186 | 0.173609 | 0.171056 | 0.168528 | 0.166023 | 0.163543 | 0.161087 |
| **-0.80** | 0.211855 | 0.208970 | 0.206108 | 0.203269 | 0.200454 | 0.197663 | 0.194895 | 0.192150 | 0.189430 | 0.186733 |
| **-0.70** | 0.241964 | 0.238852 | 0.235762 | 0.232695 | 0.229650 | 0.226627 | 0.223627 | 0.220650 | 0.217695 | 0.214764 |
| **-0.60** | 0.274253 | 0.270931 | 0.267629 | 0.264347 | 0.261086 | 0.257846 | 0.254627 | 0.251429 | 0.248252 | 0.245097 |
| **-0.50** | 0.308538 | 0.305026 | 0.301532 | 0.298056 | 0.294599 | 0.291160 | 0.287740 | 0.284339 | 0.280957 | 0.277595 |
| **-0.40** | 0.344578 | 0.340903 | 0.337243 | 0.333598 | 0.329969 | 0.326355 | 0.322758 | 0.319178 | 0.315614 | 0.312067 |
| **-0.30** | 0.382089 | 0.378280 | 0.374484 | 0.370700 | 0.366928 | 0.363169 | 0.359424 | 0.355691 | 0.351973 | 0.348268 |
| **-0.20** | 0.420740 | 0.416834 | 0.412936 | 0.409046 | 0.405165 | 0.401294 | 0.397432 | 0.393580 | 0.389739 | 0.385908 |
| **-0.10** | 0.460172 | 0.456205 | 0.452242 | 0.448283 | 0.444330 | 0.440382 | 0.436441 | 0.432505 | 0.428576 | 0.424655 |
| **-0.00** | 0.500000 | 0.496011 | 0.492022 | 0.488034 | 0.484047 | 0.480061 | 0.476078 | 0.472097 | 0.468119 | 0.464144 |
| **Z** | **0.00** | **0.01** | **0.02** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
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| **Z** | **0.00** | **0.01** | **0.02** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
| **0.00** | 0.500000 | 0.503989 | 0.507978 | 0.511966 | 0.515953 | 0.519939 | 0.523922 | 0.527903 | 0.531881 | 0.535856 |
| **0.10** | 0.539828 | 0.543795 | 0.547758 | 0.551717 | 0.555670 | 0.559618 | 0.563559 | 0.567495 | 0.571424 | 0.575345 |
| **0.20** | 0.579260 | 0.583166 | 0.587064 | 0.590954 | 0.594835 | 0.598706 | 0.602568 | 0.606420 | 0.610261 | 0.614092 |
| **0.30** | 0.617911 | 0.621720 | 0.625516 | 0.629300 | 0.633072 | 0.636831 | 0.640576 | 0.644309 | 0.648027 | 0.651732 |
| **0.40** | 0.655422 | 0.659097 | 0.662757 | 0.666402 | 0.670031 | 0.673645 | 0.677242 | 0.680822 | 0.684386 | 0.687933 |
| **0.50** | 0.691462 | 0.694974 | 0.698468 | 0.701944 | 0.705401 | 0.708840 | 0.712260 | 0.715661 | 0.719043 | 0.722405 |
| **0.60** | 0.725747 | 0.729069 | 0.732371 | 0.735653 | 0.738914 | 0.742154 | 0.745373 | 0.748571 | 0.751748 | 0.754903 |
| **0.70** | 0.758036 | 0.761148 | 0.764238 | 0.767305 | 0.770350 | 0.773373 | 0.776373 | 0.779350 | 0.782305 | 0.785236 |
| **0.80** | 0.788145 | 0.791030 | 0.793892 | 0.796731 | 0.799546 | 0.802337 | 0.805105 | 0.807850 | 0.810570 | 0.813267 |
| **0.90** | 0.815940 | 0.818589 | 0.821214 | 0.823814 | 0.826391 | 0.828944 | 0.831472 | 0.833977 | 0.836457 | 0.838913 |
| **1.00** | 0.841345 | 0.843752 | 0.846136 | 0.848495 | 0.850830 | 0.853141 | 0.855428 | 0.857690 | 0.859929 | 0.862143 |
| **1.10** | 0.864334 | 0.866500 | 0.868643 | 0.870762 | 0.872857 | 0.874928 | 0.876976 | 0.879000 | 0.881000 | 0.882977 |
| **1.20** | 0.884930 | 0.886861 | 0.888768 | 0.890651 | 0.892512 | 0.894350 | 0.896165 | 0.897958 | 0.899727 | 0.901475 |
| **1.30** | 0.903200 | 0.904902 | 0.906582 | 0.908241 | 0.909877 | 0.911492 | 0.913085 | 0.914657 | 0.916207 | 0.917736 |
| **1.40** | 0.919243 | 0.920730 | 0.922196 | 0.923641 | 0.925066 | 0.926471 | 0.927855 | 0.929219 | 0.930563 | 0.931888 |
| **1.50** | 0.933193 | 0.934478 | 0.935745 | 0.936992 | 0.938220 | 0.939429 | 0.940620 | 0.941792 | 0.942947 | 0.944083 |
| **1.60** | 0.945201 | 0.946301 | 0.947384 | 0.948449 | 0.949497 | 0.950529 | 0.951543 | 0.952540 | 0.953521 | 0.954486 |
| **1.70** | 0.955435 | 0.956367 | 0.957284 | 0.958185 | 0.959070 | 0.959941 | 0.960796 | 0.961636 | 0.962462 | 0.963273 |
| **1.80** | 0.964070 | 0.964852 | 0.965620 | 0.966375 | 0.967116 | 0.967843 | 0.968557 | 0.969258 | 0.969946 | 0.970621 |
| **1.90** | 0.971283 | 0.971933 | 0.972571 | 0.973197 | 0.973810 | 0.974412 | 0.975002 | 0.975581 | 0.976148 | 0.976705 |
| **2.00** | 0.977250 | 0.977784 | 0.978308 | 0.978822 | 0.979325 | 0.979818 | 0.980301 | 0.980774 | 0.981237 | 0.981691 |
| **2.10** | 0.982136 | 0.982571 | 0.982997 | 0.983414 | 0.983823 | 0.984222 | 0.984614 | 0.984997 | 0.985371 | 0.985738 |
| **2.20** | 0.986097 | 0.986447 | 0.986791 | 0.987126 | 0.987455 | 0.987776 | 0.988089 | 0.988396 | 0.988696 | 0.988989 |
| **2.30** | 0.989276 | 0.989556 | 0.989830 | 0.990097 | 0.990358 | 0.990613 | 0.990863 | 0.991106 | 0.991344 | 0.991576 |
| **2.40** | 0.991802 | 0.992024 | 0.992240 | 0.992451 | 0.992656 | 0.992857 | 0.993053 | 0.993244 | 0.993431 | 0.993613 |
| **2.50** | 0.993790 | 0.993963 | 0.994132 | 0.994297 | 0.994457 | 0.994614 | 0.994766 | 0.994915 | 0.995060 | 0.995201 |
| **2.60** | 0.995339 | 0.995473 | 0.995604 | 0.995731 | 0.995855 | 0.995975 | 0.996093 | 0.996207 | 0.996319 | 0.996427 |
| **2.70** | 0.996533 | 0.996636 | 0.996736 | 0.996833 | 0.996928 | 0.997020 | 0.997110 | 0.997197 | 0.997282 | 0.997365 |
| **2.80** | 0.997445 | 0.997523 | 0.997599 | 0.997673 | 0.997744 | 0.997814 | 0.997882 | 0.997948 | 0.998012 | 0.998074 |
| **2.90** | 0.998134 | 0.998193 | 0.998250 | 0.998305 | 0.998359 | 0.998411 | 0.998462 | 0.998511 | 0.998559 | 0.998605 |
| **3.00** | 0.998650 | 0.998694 | 0.998736 | 0.998777 | 0.998817 | 0.998856 | 0.998893 | 0.998930 | 0.998965 | 0.998999 |
| **3.10** | 0.999032 | 0.999065 | 0.999096 | 0.999126 | 0.999155 | 0.999184 | 0.999211 | 0.999238 | 0.999264 | 0.999289 |
| **3.20** | 0.999313 | 0.999336 | 0.999359 | 0.999381 | 0.999402 | 0.999423 | 0.999443 | 0.999462 | 0.999481 | 0.999499 |
| **3.30** | 0.999517 | 0.999534 | 0.999550 | 0.999566 | 0.999581 | 0.999596 | 0.999610 | 0.999624 | 0.999638 | 0.999651 |
| **3.40** | 0.999663 | 0.999675 | 0.999687 | 0.999698 | 0.999709 | 0.999720 | 0.999730 | 0.999740 | 0.999749 | 0.999758 |
| **3.50** | 0.999767 | 0.999776 | 0.999784 | 0.999792 | 0.999800 | 0.999807 | 0.999815 | 0.999822 | 0.999828 | 0.999835 |
| **3.60** | 0.999841 | 0.999847 | 0.999853 | 0.999858 | 0.999864 | 0.999869 | 0.999874 | 0.999879 | 0.999883 | 0.999888 |
| **3.70** | 0.999892 | 0.999896 | 0.999900 | 0.999904 | 0.999908 | 0.999912 | 0.999915 | 0.999918 | 0.999922 | 0.999925 |
| **3.80** | 0.999928 | 0.999931 | 0.999933 | 0.999936 | 0.999938 | 0.999941 | 0.999943 | 0.999946 | 0.999948 | 0.999950 |
| **3.90** | 0.999952 | 0.999954 | 0.999956 | 0.999958 | 0.999959 | 0.999961 | 0.999963 | 0.999964 | 0.999966 | 0.999967 |
| **4.00** | 0.999968 | 0.999970 | 0.999971 | 0.999972 | 0.999973 | 0.999974 | 0.999975 | 0.999976 | 0.999977 | 0.999978 |
| **Z** | **0.00** | **0.01** | **0.02** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |

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| For a particular number of degrees of freedom, entry represents the critical value of t distribution corresponding to a specific two-tail area and a specific upper-tail area (). |
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| *Degrees of Freedom* | TWO-TAIL AREAS |
| 0.50 | 0.20 | 0.10 | 0.05 | 0.02 | 0.01 |
| UPPER-TAIL AREAS |
| 0.25 | 0.10 | 0.05 | 0.025 | 0.01 | 0.005 |
| 1 | 1.0000 | 3.0777 | 6.3138 | 12.7062 | 31.8205 | 63.6567 |
| 2 | 0.8165 | 1.8856 | 2.9200 | 4.3027 | 6.9646 | 9.9248 |
| 3 | 0.7649 | 1.6377 | 2.3534 | 3.1824 | 4.5407 | 5.8409 |
| 4 | 0.7407 | 1.5332 | 2.1318 | 2.7764 | 3.7469 | 4.6041 |
| 5 | 0.7267 | 1.4759 | 2.0150 | 2.5706 | 3.3649 | 4.0321 |
| 6 | 0.7176 | 1.4398 | 1.9432 | 2.4469 | 3.1427 | 3.7074 |
| 7 | 0.7111 | 1.4149 | 1.8946 | 2.3646 | 2.9980 | 3.4995 |
| 8 | 0.7064 | 1.3968 | 1.8595 | 2.3060 | 2.8965 | 3.3554 |
| 9 | 0.7027 | 1.3830 | 1.8331 | 2.2622 | 2.8214 | 3.2498 |
| 10 | 0.6998 | 1.3722 | 1.8125 | 2.2281 | 2.7638 | 3.1693 |
| 11 | 0.6974 | 1.3634 | 1.7959 | 2.2010 | 2.7181 | 3.1058 |
| 12 | 0.6955 | 1.3562 | 1.7823 | 2.1788 | 2.6810 | 3.0545 |
| 13 | 0.6938 | 1.3502 | 1.7709 | 2.1604 | 2.6503 | 3.0123 |
| 14 | 0.6924 | 1.3450 | 1.7613 | 2.1448 | 2.6245 | 2.9768 |
| 15 | 0.6912 | 1.3406 | 1.7531 | 2.1314 | 2.6025 | 2.9467 |
| 16 | 0.6901 | 1.3368 | 1.7459 | 2.1199 | 2.5835 | 2.9208 |
| 17 | 0.6892 | 1.3334 | 1.7396 | 2.1098 | 2.5669 | 2.8982 |
| 18 | 0.6884 | 1.3304 | 1.7341 | 2.1009 | 2.5524 | 2.8784 |
| 19 | 0.6876 | 1.3277 | 1.7291 | 2.0930 | 2.5395 | 2.8609 |
| 20 | 0.6870 | 1.3253 | 1.7247 | 2.0860 | 2.5280 | 2.8453 |
| 21 | 0.6864 | 1.3232 | 1.7207 | 2.0796 | 2.5176 | 2.8314 |
| 22 | 0.6858 | 1.3212 | 1.7171 | 2.0739 | 2.5083 | 2.8188 |
| 23 | 0.6853 | 1.3195 | 1.7139 | 2.0687 | 2.4999 | 2.8073 |
| 24 | 0.6848 | 1.3178 | 1.7109 | 2.0639 | 2.4922 | 2.7969 |
| 25 | 0.6844 | 1.3163 | 1.7081 | 2.0595 | 2.4851 | 2.7874 |
| 26 | 0.6840 | 1.3150 | 1.7056 | 2.0555 | 2.4786 | 2.7787 |
| 27 | 0.6837 | 1.3137 | 1.7033 | 2.0518 | 2.4727 | 2.7707 |
| 28 | 0.6834 | 1.3125 | 1.7011 | 2.0484 | 2.4671 | 2.7633 |
| 29 | 0.6830 | 1.3114 | 1.6991 | 2.0452 | 2.4620 | 2.7564 |
| 30 | 0.6828 | 1.3104 | 1.6973 | 2.0423 | 2.4573 | 2.7500 |
| 31 | 0.6825 | 1.3095 | 1.6955 | 2.0395 | 2.4528 | 2.7440 |
| 32 | 0.6822 | 1.3086 | 1.6939 | 2.0369 | 2.4487 | 2.7385 |
| 33 | 0.6820 | 1.3077 | 1.6924 | 2.0345 | 2.4448 | 2.7333 |
| 34 | 0.6818 | 1.3070 | 1.6909 | 2.0322 | 2.4411 | 2.7284 |
| 35 | 0.6816 | 1.3062 | 1.6896 | 2.0301 | 2.4377 | 2.7238 |
| 36 | 0.6814 | 1.3055 | 1.6883 | 2.0281 | 2.4345 | 2.7195 |
| 37 | 0.6812 | 1.3049 | 1.6871 | 2.0262 | 2.4314 | 2.7154 |
| 38 | 0.6810 | 1.3042 | 1.6860 | 2.0244 | 2.4286 | 2.7116 |
| 39 | 0.6808 | 1.3036 | 1.6849 | 2.0227 | 2.4258 | 2.7079 |
| 40 | 0.6807 | 1.3031 | 1.6839 | 2.0211 | 2.4233 | 2.7045 |
| 41 | 0.6805 | 1.3025 | 1.6829 | 2.0195 | 2.4208 | 2.7012 |
| 42 | 0.6804 | 1.3020 | 1.6820 | 2.0181 | 2.4185 | 2.6981 |
| 43 | 0.6802 | 1.3016 | 1.6811 | 2.0167 | 2.4163 | 2.6951 |
| 44 | 0.6801 | 1.3011 | 1.6802 | 2.0154 | 2.4141 | 2.6923 |
| 45 | 0.6800 | 1.3006 | 1.6794 | 2.0141 | 2.4121 | 2.6896 |
| 46 | 0.6799 | 1.3002 | 1.6787 | 2.0129 | 2.4102 | 2.6870 |
| 47 | 0.6797 | 1.2998 | 1.6779 | 2.0117 | 2.4083 | 2.6846 |
| 48 | 0.6796 | 1.2994 | 1.6772 | 2.0106 | 2.4066 | 2.6822 |
| 49 | 0.6795 | 1.2991 | 1.6766 | 2.0096 | 2.4049 | 2.6800 |
| 50 | 0.6794 | 1.2987 | 1.6759 | 2.0086 | 2.4033 | 2.6778 |
| 51 | 0.6793 | 1.2984 | 1.6753 | 2.0076 | 2.4017 | 2.6757 |
| 52 | 0.6792 | 1.2980 | 1.6747 | 2.0066 | 2.4002 | 2.6737 |
| 53 | 0.6791 | 1.2977 | 1.6741 | 2.0057 | 2.3988 | 2.6718 |
| 54 | 0.6791 | 1.2974 | 1.6736 | 2.0049 | 2.3974 | 2.6700 |
| 55 | 0.6790 | 1.2971 | 1.6730 | 2.0040 | 2.3961 | 2.6682 |
| 56 | 0.6789 | 1.2969 | 1.6725 | 2.0032 | 2.3948 | 2.6665 |
| 57 | 0.6788 | 1.2966 | 1.6720 | 2.0025 | 2.3936 | 2.6649 |
| 58 | 0.6787 | 1.2963 | 1.6716 | 2.0017 | 2.3924 | 2.6633 |
| 59 | 0.6787 | 1.2961 | 1.6711 | 2.0010 | 2.3912 | 2.6618 |
| 60 | 0.6786 | 1.2958 | 1.6706 | 2.0003 | 2.3901 | 2.6603 |
| 61 | 0.6785 | 1.2956 | 1.6702 | 1.9996 | 2.3890 | 2.6589 |
| 62 | 0.6785 | 1.2954 | 1.6698 | 1.9990 | 2.3880 | 2.6575 |
| 63 | 0.6784 | 1.2951 | 1.6694 | 1.9983 | 2.3870 | 2.6561 |
| 64 | 0.6783 | 1.2949 | 1.6690 | 1.9977 | 2.3860 | 2.6549 |
| 65 | 0.6783 | 1.2947 | 1.6686 | 1.9971 | 2.3851 | 2.6536 |
| 66 | 0.6782 | 1.2945 | 1.6683 | 1.9966 | 2.3842 | 2.6524 |
| 67 | 0.6782 | 1.2943 | 1.6679 | 1.9960 | 2.3833 | 2.6512 |
| 68 | 0.6781 | 1.2941 | 1.6676 | 1.9955 | 2.3824 | 2.6501 |
| 69 | 0.6781 | 1.2939 | 1.6672 | 1.9949 | 2.3816 | 2.6490 |
| 70 | 0.6780 | 1.2938 | 1.6669 | 1.9944 | 2.3808 | 2.6479 |
| 71 | 0.6780 | 1.2936 | 1.6666 | 1.9939 | 2.3800 | 2.6469 |
| 72 | 0.6779 | 1.2934 | 1.6663 | 1.9935 | 2.3793 | 2.6459 |
| 73 | 0.6779 | 1.2933 | 1.6660 | 1.9930 | 2.3785 | 2.6449 |
| 74 | 0.6778 | 1.2931 | 1.6657 | 1.9925 | 2.3778 | 2.6439 |
| 75 | 0.6778 | 1.2929 | 1.6654 | 1.9921 | 2.3771 | 2.6430 |
| 76 | 0.6777 | 1.2928 | 1.6652 | 1.9917 | 2.3764 | 2.6421 |
| 77 | 0.6777 | 1.2926 | 1.6649 | 1.9913 | 2.3758 | 2.6412 |
| 78 | 0.6776 | 1.2925 | 1.6646 | 1.9908 | 2.3751 | 2.6403 |
| 79 | 0.6776 | 1.2924 | 1.6644 | 1.9905 | 2.3745 | 2.6395 |
| 80 | 0.6776 | 1.2922 | 1.6641 | 1.9901 | 2.3739 | 2.6387 |
| 81 | 0.6775 | 1.2921 | 1.6639 | 1.9897 | 2.3733 | 2.6379 |
| 82 | 0.6775 | 1.2920 | 1.6636 | 1.9893 | 2.3727 | 2.6371 |
| 83 | 0.6775 | 1.2918 | 1.6634 | 1.9890 | 2.3721 | 2.6364 |
| 84 | 0.6774 | 1.2917 | 1.6632 | 1.9886 | 2.3716 | 2.6356 |
| 85 | 0.6774 | 1.2916 | 1.6630 | 1.9883 | 2.3710 | 2.6349 |
| 86 | 0.6774 | 1.2915 | 1.6628 | 1.9879 | 2.3705 | 2.6342 |
| 87 | 0.6773 | 1.2914 | 1.6626 | 1.9876 | 2.3700 | 2.6335 |
| 88 | 0.6773 | 1.2912 | 1.6624 | 1.9873 | 2.3695 | 2.6329 |
| 89 | 0.6773 | 1.2911 | 1.6622 | 1.9870 | 2.3690 | 2.6322 |
| 90 | 0.6772 | 1.2910 | 1.6620 | 1.9867 | 2.3685 | 2.6316 |
| 91 | 0.6772 | 1.2909 | 1.6618 | 1.9864 | 2.3680 | 2.6309 |
| 92 | 0.6772 | 1.2908 | 1.6616 | 1.9861 | 2.3676 | 2.6303 |
| 93 | 0.6771 | 1.2907 | 1.6614 | 1.9858 | 2.3671 | 2.6297 |
| 94 | 0.6771 | 1.2906 | 1.6612 | 1.9855 | 2.3667 | 2.6291 |
| 95 | 0.6771 | 1.2905 | 1.6611 | 1.9853 | 2.3662 | 2.6286 |
| 96 | 0.6771 | 1.2904 | 1.6609 | 1.9850 | 2.3658 | 2.6280 |
| 97 | 0.6770 | 1.2903 | 1.6607 | 1.9847 | 2.3654 | 2.6275 |
| 98 | 0.6770 | 1.2902 | 1.6606 | 1.9845 | 2.3650 | 2.6269 |
| 99 | 0.6770 | 1.2902 | 1.6604 | 1.9842 | 2.3646 | 2.6264 |
| 100 | 0.6770 | 1.2901 | 1.6602 | 1.9840 | 2.3642 | 2.6259 |
| 101 | 0.6769 | 1.2900 | 1.6601 | 1.9837 | 2.3638 | 2.6254 |
| 102 | 0.6769 | 1.2899 | 1.6599 | 1.9835 | 2.3635 | 2.6249 |
| 103 | 0.6769 | 1.2898 | 1.6598 | 1.9833 | 2.3631 | 2.6244 |
| 104 | 0.6769 | 1.2897 | 1.6596 | 1.9830 | 2.3627 | 2.6239 |
| 105 | 0.6768 | 1.2897 | 1.6595 | 1.9828 | 2.3624 | 2.6235 |
| 110 | 0.6767 | 1.2893 | 1.6588 | 1.9818 | 2.3607 | 2.6213 |
| 120 | 0.6765 | 1.2886 | 1.6577 | 1.9799 | 2.3578 | 2.6174 |
| Infinity | 0.6745 | 1.2816 | 1.6449 | 1.9600 | 2.3263 | 2.5758 |
| *Degrees of Freedom* | TWO-TAIL AREAS |
| 0.50 | 0.20 | 0.10 | 0.05 | 0.02 | 0.01 |
| UPPER-TAIL AREAS |
| 0.25 | 0.10 | 0.05 | 0.025 | 0.01 | 0.005 |