

Table of z values and probabilities for the standard normal distribution. z is the first column plus the top row. Each cell shows $P(X \leq z)$. For example $P(X \leq 1.04) = .8508$. For $z < 0$ subtract the value from 1, e.g., $P(X \leq -1.04) = 1 - .8508 = .1492$.

z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

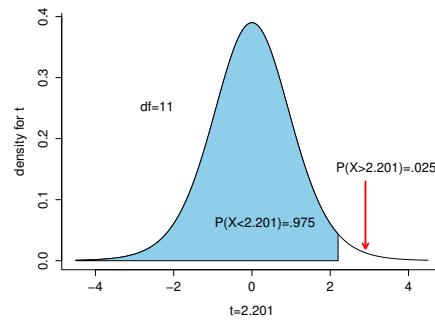


Table of t values and right tail probabilities. Degrees of freedom are in the first column (df). **Right tail probabilities** are in the first row. For example for $d.f. = 7$ and $\alpha = .05$ the critical t value for a two-tail test is 2.365 and for $d.f. = 10$ and $\alpha = .1$ the critical t value for a one-tail test is 1.372.

df	.1	.05	.025	.01	.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
50	1.299	1.676	2.009	2.403	2.678
75	1.293	1.665	1.992	2.377	2.643
100	1.290	1.660	1.984	2.364	2.626

Table of F values for right tail probabilities of .05. Degrees of freedom for denominator are in the first column and degrees of freedom for the numerator are in the top row.

denom.	numerator df									
df	1	2	3	4	5	7	10	15	50	100
1	161.45	199.5	215.71	224.58	230.16	236.77	241.88	245.95	251.77	253.04
2	18.51	19	19.16	19.25	19.3	19.35	19.4	19.43	19.48	19.49
3	10.13	9.55	9.28	9.12	9.01	8.89	8.79	8.7	8.58	8.55
4	7.71	6.94	6.59	6.39	6.26	6.09	5.96	5.86	5.7	5.66
5	6.61	5.79	5.41	5.19	5.05	4.88	4.74	4.62	4.44	4.41
6	5.99	5.14	4.76	4.53	4.39	4.21	4.06	3.94	3.75	3.71
7	5.59	4.74	4.35	4.12	3.97	3.79	3.64	3.51	3.32	3.27
8	5.32	4.46	4.07	3.84	3.69	3.5	3.35	3.22	3.02	2.97
9	5.12	4.26	3.86	3.63	3.48	3.29	3.14	3.01	2.8	2.76
10	4.96	4.1	3.71	3.48	3.33	3.14	2.98	2.85	2.64	2.59
11	4.84	3.98	3.59	3.36	3.2	3.01	2.85	2.72	2.51	2.46
12	4.75	3.89	3.49	3.26	3.11	2.91	2.75	2.62	2.4	2.35
13	4.67	3.81	3.41	3.18	3.03	2.83	2.67	2.53	2.31	2.26
14	4.6	3.74	3.34	3.11	2.96	2.76	2.6	2.46	2.24	2.19
15	4.54	3.68	3.29	3.06	2.9	2.71	2.54	2.4	2.18	2.12
16	4.49	3.63	3.24	3.01	2.85	2.66	2.49	2.35	2.12	2.07
17	4.45	3.59	3.2	2.96	2.81	2.61	2.45	2.31	2.08	2.02
18	4.41	3.55	3.16	2.93	2.77	2.58	2.41	2.27	2.04	1.98
19	4.38	3.52	3.13	2.9	2.74	2.54	2.38	2.23	2	1.94
20	4.35	3.49	3.1	2.87	2.71	2.51	2.35	2.2	1.97	1.91
21	4.32	3.47	3.07	2.84	2.68	2.49	2.32	2.18	1.94	1.88
22	4.3	3.44	3.05	2.82	2.66	2.46	2.3	2.15	1.91	1.85
23	4.28	3.42	3.03	2.8	2.64	2.44	2.27	2.13	1.88	1.82
24	4.26	3.4	3.01	2.78	2.62	2.42	2.25	2.11	1.86	1.8
25	4.24	3.39	2.99	2.76	2.6	2.4	2.24	2.09	1.84	1.78
26	4.23	3.37	2.98	2.74	2.59	2.39	2.22	2.07	1.82	1.76
27	4.21	3.35	2.96	2.73	2.57	2.37	2.2	2.06	1.81	1.74
28	4.2	3.34	2.95	2.71	2.56	2.36	2.19	2.04	1.79	1.73
29	4.18	3.33	2.93	2.7	2.55	2.35	2.18	2.03	1.77	1.71
30	4.17	3.32	2.92	2.69	2.53	2.33	2.16	2.01	1.76	1.7
40	4.08	3.23	2.84	2.61	2.45	2.25	2.08	1.92	1.66	1.59
60	4	3.15	2.76	2.53	2.37	2.17	1.99	1.84	1.56	1.48
100	3.94	3.09	2.7	2.46	2.31	2.1	1.93	1.77	1.48	1.39
1000	3.85	3	2.61	2.38	2.22	2.02	1.84	1.68	1.36	1.26

<p>Chapter 1: no key formulas. Chapter 2: Relative Frequency=freq. of the class / n. Approx. Class Width: =(largest value-smallest value) / number of classes. Chapter 3: sample and population means</p> $\bar{x} = \sum x_i/n \text{ and } \mu = \sum x_i/N$ <p>Weighted mean and geometric mean</p> $\bar{x} = \sum w_i x_i / w_i \text{ and } \bar{x}_g = [(x_1)(x_2) \dots (x_n)]^{1/n}.$ <p>Interquartile Range: IQR = $Q_3 - Q_1$. Population and sample variance</p> $\sigma^2 = \frac{\sum (x_i - \mu)^2}{N} \text{ and } s^2 = \frac{\sum (x_i - \bar{x})^2}{n - 1}$ <p>Population and sample standard deviation</p> $\sigma = \sqrt{\sigma^2} \text{ and } s = \sqrt{s^2}.$ <p>Coefficient of Variation</p> $\left(\frac{\text{Standard deviation}}{\text{Mean}} \times 100 \right) \%$ <p>z-Score: $z_i = \frac{x_i - \bar{x}}{s}$. Population and Sample Covariance</p> $\sigma_{xy} = \frac{\sum (x_i - \mu_x)(y_i - \mu_y)}{N} \text{ and } s_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n - 1}$ <p>Population and Sample Pearson Correlation</p> $\rho_{xy} = \sigma_{xy} / (\sigma_x \sigma_y) \text{ and } r_{xy} = s_{xy} / (s_x s_y).$ <p>Chapter 4: Counting Rule for Combinations</p> $C_n^N = \binom{N}{n} = \frac{N!}{n!(N-n)!}.$ <p>Counting Rule for Permutations</p> $P_n^N = n! \binom{N}{n} = \frac{N!}{(N-n)!}.$ <p>Probability Rules: $P(A) = 1 - P(A^c)$</p>	<p>Chapter 4 continued:</p> $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A B) = \frac{P(A \cap B)}{P(B)}$ $P(A \cap B) = P(B)P(A B) = P(A)P(B A).$ <p>Multiplication Law for Independent Events</p> $P(A \cap B) = P(B)P(A).$ <p>Bayes' Theorem</p> $P(A_i B) = \frac{P(A_i)P(B A_i)}{P(A_1)P(B A_1) + P(A_2)P(B A_2) + \dots + P(A_n)P(B A_n)}$ <p>Chapter 5: Discrete Uniform Probability Mass Function: $f(x) = 1/n$. Expected Value of a Discrete R. V.: $E(x) = \mu = \sum x f(x)$. Variance of a Discrete R. V.:</p> $Var(x) = \sigma^2 = \sum (x - \mu)^2 f(x).$ <p>Number of Experimental Outcomes Providing Exactly x Successes in n Trials</p> $\binom{n}{x} = \frac{n!}{x!(n-x)!}.$ <p>Binomial Probability Mass Function</p> $P(X = x) = f(x) = \binom{n}{x} p^x (1-p)^{(n-x)}.$ <p>Expected Value for Binomial Distribution: $E(x) = \mu = np$. Variance for Binomial Distr.: $Var(x) = \sigma^2 = np(1-p)$. Poisson Probability Mass Function:</p> $P(X = x \mu) = f(x) = \frac{\mu^x e^{-\mu}}{x!}.$ <p>Hypergeometric Probability Mass Function and Expected Value:</p> $f(x) = \frac{\binom{r}{x} \binom{N-r}{n-x}}{\binom{N}{n}} \text{ and } E(x) = \mu = \frac{nr}{N}.$	<p>Chapter 5 continued: Variance for the Hypergeometric Distribution:</p> $Var(x) = \sigma^2 = n \left(\frac{r}{N} \right) \left(1 - \frac{r}{N} \right) \left(\frac{N-n}{N-1} \right).$ <p>Chapter 6: Uniform PDF</p> $f(x) = \begin{cases} \frac{1}{b-a} & \text{if } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$ <p>Normal PDF The density function is</p> $f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right).$ <p>Converting to the Standard Normal rv:</p> $z = \frac{x - \mu}{\sigma}.$ <p>Exponential PDF and CDF for $x \geq 0$</p> $f(x) = \mu^{-1} e^{-x/\mu} \text{ and } P(x \leq x_0) = 1 - e^{-x_0/\mu}.$ <p>Chapter 7: expected value of \bar{x}</p> $E(\bar{x}) = \mu.$ <p>Standard Deviation of \bar{x} (Standard Error)</p> $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}.$ <p>Expected Value and Std Dev (Standard Error) of \bar{p}</p> $E(\bar{p}) = p \text{ and } \sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$ <p>Finite Pop. Correction Factor: $\sqrt{(N-n)/(N-1)}$. Chapter 8: Interval Estimate of Population Mean, σ known and unknown</p> $\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \text{ and } \bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$ <p>Necessary Sample Size for Interval Estimate of μ</p> $n = \frac{(z_{\alpha/2})^2 \sigma^2}{E^2}$
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<p>Chapter 8 continued: Interval Estimate of p</p> $\hat{p} \pm z_{\alpha/2} \frac{p(1-p)}{\sqrt{n}}$ <p>Necessary Sample Size for Interval Estimate of p</p> $n = \frac{(z_{\alpha/2})^2 p^*(1-p^*)}{E^2}$ <p>Chapter 9: Test Statistic for Hypothesis Tests About μ, σ known and unknown</p> $z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \text{ and } t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$ <p>Test Stat for Hypothesis About p</p> $z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$ <p>Chapter 10: Point Estimate and Standard Error for Difference in Two Population Means</p> $\bar{x}_1 - \bar{x}_2 \text{ and } \sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$ <p>Interval Estimate and Test Statistic for Difference in Two Means with Known Variances</p> $\bar{x}_1 - \bar{x}_2 \pm z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} \text{ and } z = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ <p>Interval Estimate and Test Statistic for Difference in Two Means with Unknown Variances</p> $\bar{x}_1 - \bar{x}_2 \pm t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \text{ and } t = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$ <p>Degrees of Freedom for t, Two Independent Random Samples</p> $df = \frac{1}{\frac{1}{n_1-1} \left(\frac{s_1^2}{n_1}\right)^2 + \frac{1}{n_2-1} \left(\frac{s_2^2}{n_2}\right)^2} \left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)$	<p>Chapter 10 continued: Test Statistic (Matched Samples)</p> $t = \frac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$ <p>ANOVA Related:</p> $\bar{x}_j = \frac{\sum_{i=1}^{n_j} x_{ij}}{n_j} \quad s_j^2 = \frac{\sum_{i=1}^{n_j} (x_{ij} - \bar{x}_j)^2}{n_j - 1} \quad \bar{\bar{x}} = \frac{\sum_{j=1}^k \sum_{i=1}^{n_j} x_{ij}}{n_T}$ $MSTR = \frac{SSTR}{k-1} \quad SSTR = \sum_{j=1}^k n_j (\bar{x}_j - \bar{\bar{x}})^2 \quad MSE = \frac{SSE}{n_T - k}$ $SSE = \sum_{j=1}^k \sum_{i=1}^{n_j} (x_{ij} - \bar{x}_j)^2 \quad F = MSTR/MSE$ $SST = \sum_{j=1}^k \sum_{i=1}^{n_j} (x_{ij} - \bar{\bar{x}})^2 \quad SST = SSTR + SSE$ <p>Chapter 11: not covered in this course Chapter 12: $y = \beta_0 + \beta_1 x + \epsilon$</p> $E(y) = \beta_0 + \beta_1 x \quad \hat{y} = b_0 + b_1 x \quad b_0 = \bar{y} - b_1 \bar{x}$ $b_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \quad SSE = \sum (y_i - \hat{y}_i)^2$ $SST = \sum (y_i - \bar{y})^2 \quad SSR = \sum (\hat{y}_i - \bar{y})^2 \quad SST = SSR + SSE$ $r^2 = \frac{SSR}{SST} \quad r_{xy} = (\text{sign of } b_1) \sqrt{r^2} \quad s^2 = MSE = \frac{SSE}{n-2}$ <p>Standard Error of the Estimate, $s = \sqrt{MSE}$.</p> $\sigma_{b_1} = \frac{\sigma}{\sqrt{\sum (x_i - \bar{x})^2}} \quad s_{b_1} = \frac{s}{\sqrt{\sum (x_i - \bar{x})^2}} \quad t = \frac{b_1}{s_{b_1}}$ <p>For simple regression, $MSR = SSR$ because there is only one independent variable.</p> $F = \frac{MSR}{MSE} \quad s_{\hat{y}^*} = s \sqrt{\frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}}$ <p>Confidence Interval for $E(y^*)$: $\hat{y}^* \pm t_{\alpha/2} s_{\hat{y}^*}$</p> $s_{\text{pred}} = s \sqrt{1 + \frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}}$	<p>Chapter 12 continued: Prediction Interval for y^*:</p> $\hat{y}^* \pm t_{\alpha/2} s_{\text{pred}}$ <p>Residual for Observation i: $y_i - \hat{y}_i$ Chapter 13:</p> $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \epsilon$ $E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$ $\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \dots + b_p x_p$ $SST = SSR + SSE \quad R^2 = \frac{SSR}{SST}$ $R_a^2 = 1 - (1 - R^2) \frac{n-1}{n-p-1}$ $MSR = \frac{SSR}{p} \quad MSE = \frac{SSE}{n-p-1} \quad F = \frac{MSR}{MSE}$ $t = \frac{b_i}{s_{b_i}}$ <p>Other Math Rule Reminders:</p> $e^x = \exp(x)$ $\ln 1 = 0 \quad \ln e = 1$ $x! = (x)(x-1)(x-2) \dots (2)(1)$ $0! = 1 \quad x^0 = 1$
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Use the output below to answer the appropriate questions in the exam. Be sure to check which table the question references. The ANOVA table is for life expectancy at birth for 2013 where the treatments are the regions of the globe "South Asia", "Latin America & Caribbean" and "East Asia & Pacific" and "North America" as defined by the World Bank.

ANOVA Table 1

	SS	DF	MS	F	p
Treatments	373.971	3	124.657	5.886	0.0016
Error	1037.698	49	21.178		

Here is regression output from a model where per capita GDP is the independent variable and life expectancy at birth is the dependent variable. The data are for 2013 and are available from the [World Bank](#). Countries were excluded if they had either variable missing.

Regression Table 2

Regression Statistics	
R Square	0.3601398
Adjusted R Square	0.3556337
Standard Error	7.4322543
Observations	144

ANOVA

	SS	DF	MS	F	p
Regression	4414.844	1	4414.844	79.923	0
Residual	7843.853	142	55.238		

	coefficients	standard error	t stat	p-value
intercept	66.7634889	0.76393	87.3947689	0
per capita GDP	0.0002565	0.0000287	8.9399923	0

ECN221 Exam **FINAL - VERSION A** Fall 2015 (Chapters 1-10, 12), ASU-COX

Choose the best answer. Do not write letters in the margin or communicate with other students in any way. If you have a question note it on your exam and ask for clarification when your exam is returned. In the meantime choose the best answer. Neither the proctors nor Dr. Cox will answer questions during the exam.

Please check each question and possible answers thoroughly as questions at the bottom of a page sometimes run onto the next page.

1. I have checked that my ID is bubbled in correctly. If it is bubbled in incorrectly I will get this question wrong. I also understand that questions and their possible answers may run onto the next page and so I should always check the top of the next page for possible answers. I understand that if I have a question I should simply make a note on my exam and ask Dr. Cox afterwards. I should always choose the best answer.
 - (a) False.
 - (b) I didn't read the directions.
 - (c) True.

2. Suppose you have a random variable that is uniformly distributed with a maximum of 248 and a minimum of 87. What is the expected value of this random variable?
 - (a) 187.5
 - (b) 152.5
 - (c) 167.5
 - (d) 217.75

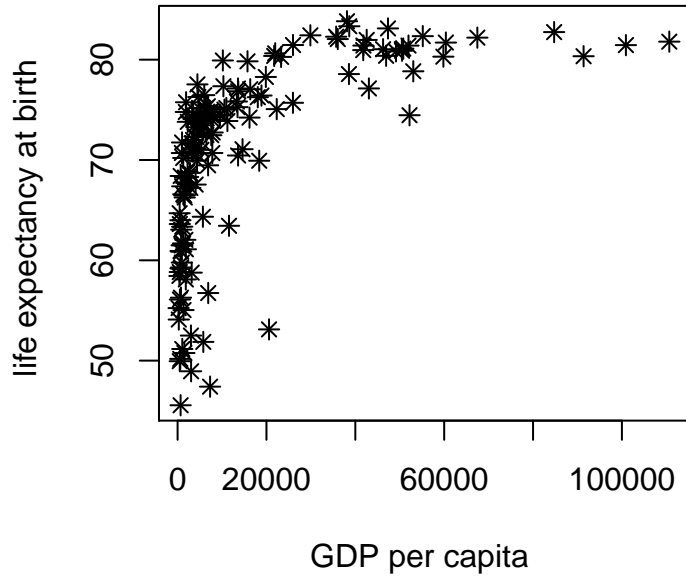
3. What is the probability of observing a z value less than 2.225?
 - (a) 0.013
 - (b) 1.107
 - (c) 0.987
 - (d) 0.917

4. Suppose that you have a sample with 34 observations. You are going to use this sample to construct a confidence interval for the population mean. How many degrees of freedom are there?
 - (a) 5.8309519

- (b) 34
 - (c) 33
 - (d) 17
5. Suppose that the known standard deviation for the numbers of hours that students work in a week is 14.5. If I draw a sample of 37 what is the standard error?
- (a) 1.9070283
 - (b) 2.3837853
 - (c) 0.3918919
 - (d) 3.0989209
6. For a given value of α when you are testing the hypothesis $H_0 : \mu_1 = \mu_2$ you
- (a) reject H_0 if the standard error is less than α
 - (b) reject H_0 if the test statistic is less than α
 - (c) reject H_0 if the critical value is less than α
 - (d) reject H_0 if the p value is less than α
7. Suppose that the number of times a college student changes their major follows a Poisson distribution with a mean of 3. What is the probability that a student will change their major exactly 2 time(s)?
- (a) 0.3360627
 - (b) 0.2240418
 - (c) 0.1344251
 - (d) 0.7759582
8. Consult Table 1. From the table you can conclude that the total sum of squares is ?
- (a) 663.726759
 - (b) 1037.6979424
 - (c) 1411.6691258
 - (d) 705.8345629
9. Consult Table 1. From the table you can conclude that the total number of observations used in this analysis/experiment was?
- (a) 51

- (b) 3
 - (c) 49
 - (d) 53
10. Consult Table 1. From the table what can you conclude concerning the null hypothesis?
- (a) depends on the number of observations.
 - (b) reject the null
 - (c) fail to reject
 - (d) cannot be determined
11. Consult Table 1. What is the test statistic?
- (a) 0.0016308
 - (b) 124.6570611
 - (c) 5.8862948.
 - (d) 2.9431474
12. Consult Table 1. What is the critical value for a test at the .05 level?
- (a) 2.79
 - (b) 1.85
 - (c) 2.62
 - (d) 3.49
13. The graph(s) shown here is/are

Example Graph



- (a) histograms
 - (b) box and whiskers plots
 - (c) scatter plots
 - (d) stem and leaf displays
14. The probability that a z value is less than -0.5 is
- (a) .5
 - (b) .3085
 - (c) .3413
 - (d) .6915
15. Suppose that you collect data on apartment prices in Tempe. You look at 41 different apartments and find a mean of 757 and a standard deviation of 156.7. Construct a 95% confidence interval for the mean apartment price. The interval is
- (a) [711.539377, 802.460623]

- (b) [707.539377, 806.460623]
 - (c) [701.539377, 812.460623]
 - (d) [636.7854393, 725.8145607]
16. Suppose that you collect data on apartment prices in Tempe. You look at 41 different apartments and find a mean of 757 and a standard deviation of 156.7. Test the hypothesis, $H_0 : \mu = 732$ at the .05 level of significance.
- (a) the test statistic is 1.0215578 so we fail to reject
 - (b) the test statistic is 1.0215578 so we reject the null
 - (c) the test statistic is 0.739402 so we fail to reject
 - (d) the test statistic is 1.2337136 so we reject the null
17. Suppose you have a random variable that is uniformly distributed with a maximum of 248 and a minimum of 87. What is the expected value of this random variable?
- (a) 167.5
 - (b) 187.5
 - (c) 152.5
 - (d) 217.75
18. The t distribution
- (a) is right skewed
 - (b) is symmetric
 - (c) is the same as the z distribution but is used when σ is unknown
 - (d) all of the above
 - (e) none of the above
19. Consider the regression output in Table 2. What is the estimated variance of the error term?
- (a) 3.7161271
 - (b) 7.4322543
 - (c) 55.2384034
 - (d) 79.923

20. Consider the regression output in Table 2. What is the percentage of variation in life expectancy that can be explained by the variation in percapita GDP?
- (a) -35.0139758%
 - (b) 43.2167709%
 - (c) 36.0139758%
 - (d) 35.56337%
21. Consider the regression output in Table 2. What is the predicted or estimated life expectancy in a country where the per capita GDP is \$10,000?
- (a) 68.8154895
 - (b) 71.8934903
 - (c) 71.1239901
 - (d) 69.3284896
22. Consider the regression output in Table 2. Suppose you want to test the hypothesis that the per capita GDP has no impact on life expectancy, i.e. $H_0 : \beta_1 = 0$. What is the test statistic for this hypothesis?
- (a) 0.0000287
 - (b) 0
 - (c) 8.9399923
 - (d) 87.3947689
23. Consider the regression output in Table 2. Suppose you want to test the hypothesis that the per capita GDP has no impact on life expectancy, i.e. $H_0 : \beta_1 = 0$. What is your conclusion for this hypothesis test?
- (a) This is inconclusive unless we know whether it is a right tail or a left tail test.
 - (b) This cannot be determined without the appropriate df.
 - (c) reject the null
 - (d) fail to reject
24. One of the assumptions of the linear regression model is that
- (a) The relationship is linear.
 - (b) The error term has constant variance.
 - (c) This error term has a normal distribution.
 - (d) All of the above.

Key

1. c
2. c
3. c
4. c
5. b
6. d
7. b
8. c
9. d
10. b
11. c
12. a
13. c
14. b
15. b
16. a
17. a
18. b
19. c
20. c
21. d
22. c
23. c
24. d