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

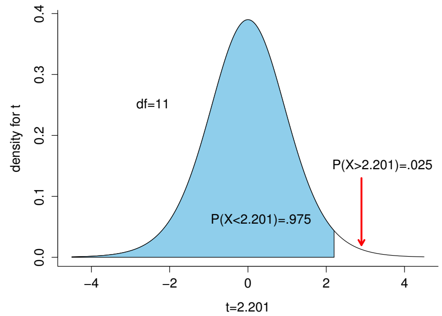


Table of t values and right tail probabilities. Degrees of freedom are in the first column (df). **Right tail probabilities** are in the first row. For example for $d.f. = 7$ and $\alpha = .05$ the critical t value for a two-tail test is 2.365 and for $d.f. = 10$ and $\alpha = .1$ the critical t value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

Chapter 3:

sample mean: $\bar{x} = \sum_{i=1}^{n} x_i / n$

sample variance: $s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$.

sample standard deviation: $s = \sqrt{s^2}$.

Coefficient of Variation: $CV = \frac{s}{\bar{x}}\left(100\%\right)$

sample z-Score: $z = \frac{x_i - \bar{x}}{s}$

Interquartile Range: IQR $= Q_3 - Q_1$.

Sample Covariance: $s_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{n-1}$

Sample Correlation Coefficient: $r_{xy} = s_{xy}/(s_x s_y)$

Chapter 4:

The complement rule: $P(A) + P(A') = 1$

addition rule: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

conditional probability: $P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$

Bayes' Theorem

$$P(A_i|B) = \frac{P(A_i)P(B|A_i)}{P(A_1)P(B|A_1) + P(A_2)P(B|A_2) + \cdots + P(A_n)P(B|A_n)}$$

Combinations: ${}_nC_x = \frac{n!}{(n-x)!x!}$

Chapter 5:

Expected Value and mean of a Discrete Probability Distribution:

$$E(x) = \mu = \sum_{i=1}^{n} x_i P(x_i)$$

Variance of a Discrete Probability Distribution:

$$\sigma^2 = \sum_{i=1}^{n}(x_i - \mu)^2 P(x_i)$$

Chapter 5 continued:

Binomial Probability Dist.: $P(x,n) = \frac{n!}{(n-x)!x!} p^x (q)^{(n-x)}$

Mean of a Binomial Distribution: $\mu = np$

Standard Dev. of a Binomial Distribution: $\sigma = \sqrt{npq}$

Poisson Probability Distribution: $P(x) = \frac{\lambda^x e^{-\lambda}}{x!}$

Chapter 6:

Normal PDF: $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(1/2)[(x-\mu)/\sigma]^2}$

the z-score: $z = \frac{x - \mu}{\sigma}$

Exponential PDF: $f(x) = \lambda e^{-\lambda x}$

Exponential CDF: $P(x \leq a) = 1 - e^{-a\lambda}$

Standard Dev. of Exponential Dist.: $\sigma = \mu = \frac{1}{\lambda}$

Continuous Uniform PDF

$$f(x) = \begin{cases} \frac{1}{b-a} & \text{if } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$$

Uniform CDF: $P(x_1 \leq x \leq x_2) = \frac{x_2 - x_1}{b - a}$

mean of the continuous uniform dist.: $\mu = \frac{a+b}{2}$

standard dev. of the continuous uniform dist.: $\sigma = \frac{b-a}{\sqrt{12}}$

Chapter 7:

standard error of the mean: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

z-score for the mean: $z_{\bar{x}} = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$

Chapter 7 continued:

sample proportion: $\bar{p} = \frac{x}{n}$

standard error of the proportion: $\sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$

Chapter 8:

Confidence Interval for the mean (σ known):

$$\bar{x} \pm z_{\alpha/2}\sigma_{\bar{x}}$$

margin of error for a CI for the mean: $ME_{\bar{x}} = z_{\alpha/2}\sigma_{\bar{x}}$

approximate standard error of the mean: $\hat{\sigma}_{\bar{x}} = \frac{s}{\sqrt{n}}$.

Confidence Interval for the mean (σ unknown):

$$\bar{x} \pm t_{\alpha/2}\hat{\sigma}_{\bar{x}}$$

Sample Size needed to Estimate a population mean

$$n = \frac{(z_{\alpha/2})^2\sigma^2}{(ME_{\bar{x}})^2}$$

Sample Size needed to Estimate the population proportion

$$n = \frac{(z_{\alpha/2})^2\bar{p}(1-\bar{p})}{(ME_p)^2}$$

Chapter 9:

the z-test statistic for a hypothesis test for the population mean (when σ is known)

$$z_{\bar{x}} = \frac{\bar{x} - \mu_{H_0}}{\sigma/\sqrt{n}}$$

the t-test statistic for a hypothesis test for the population mean (when σ is unknown)

$$t_{\bar{x}} = \frac{\bar{x} - \mu_{H_0}}{s/\sqrt{n}}$$

Chapter 10:

the mean of the sampling distribution for the difference in means:

$$\mu_{\bar{x}_1-\bar{x}_2} = \mu_{\bar{x}_1} - \mu_{\bar{x}_2}$$

the standard error of the difference between two means:

$$\sigma_{\bar{x}_1-\bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

the z-test statistic for a hypothesis test for the difference between two means (σ_1 and σ_2 known)

$$z_{\bar{x}} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_{H_0}}{\sigma_{\bar{x}_1-\bar{x}_2}}$$

the t-test statistic for a hypothesis test for the difference between two means (σ_1 and σ_2 unknown but equal)

$$t_{\bar{x}} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_{H_0}}{\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

pooled variance: $s_p^2 = \dfrac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{(n_1-1)+(n_2-1)}$

the t-test statistic for a hypothesis test for the difference between two means (σ_1 and σ_2 unknown and unequal)

$$t_{\bar{x}} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_{H_0}}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}}$$

Confidence Interval for the difference between the means of two independent populations (σ_1 and σ_2 unknown but equal)

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2}\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$$

the matched-pair difference: $d = x_1 - x_2$

the mean of matched-pair difference: $\bar{d} = \dfrac{\sum_{i=1}^n d_i}{n}$

the standard deviation of the matched-pair differences

$$s_d = \sqrt{\frac{\sum_{i=1}^n (d_i - \bar{d})^2}{n-1}}$$

the t-Test Statistic for a Matched-Pair hypothesis test for the mean

$$t_{\bar{x}} = \frac{\bar{d} - (\mu_d)_{H_0}}{s_d/\sqrt{n}}$$

Chapter 11:

the total sum of squares (SST): $SST = \sum_{j=1}^{k}\sum_{i=1}^{n_j}(x_{ij} - \bar{\bar{x}})^2$

the mean square total (MST): $MST = \dfrac{SST}{n_T - 1}$

the partitioning of the Total Sum of Squares (SST) for a One-Way ANOVA: SST=SSB+SSW.

sum of squares between (SSB): $SSB = \sum_{j=1}^{k} n - j(\bar{x}_j - \bar{\bar{x}})^2$

the mean square between (MSB): $MSB = \dfrac{SSB}{k-1}$

sum of squares within (SSW): $SSW = \sum_{j=1}^{k}\sum_{i=1}^{n_j}(x_{ij} - \bar{x}_j)^2$

the mean square within (MSW): $MSW = \dfrac{SSW}{n_T - k}$

the F-test statistic for One-Way ANOVA: $F_{\bar{x}} = \dfrac{MSB}{MSW}$

Tukey-Kramer critical range:

$$CR_{ij} = Q_\alpha\sqrt{\frac{MSW}{2}\left(\frac{1}{n_i} + \frac{1}{n_j}\right)}$$

Chapter 14: simple linear regression model for a population $y_i = \beta_0 + \beta_1 x_i + \epsilon_i$

$$\hat{y} = b_0 + b_1 x \qquad e_i = y_i - \hat{y}_i$$

sum of squares error: $SSE = \sum_{i=1}^{n}(y_i - \hat{y}_i)^2$

total sum of squares (SST): $SST = \sum(y - \bar{y})^2$

$$SST = SSR + SSE$$

sum of squares regression (SSR): $SSR = \sum(\hat{y} - \bar{y})^2$

Chapter 14 continued:

$$R^2 = \frac{SSR}{SST}$$

F-statistic for the coef. of determination: $F = \dfrac{SSR}{SSE/(n-2)}$

Standard Error of the Estimate, $s_e = \sqrt{SSE/(n-2)}$.
Confidence Interval (CI) for an average value of Y:

$$CI = \hat{y}^* \pm t_{\alpha/2}s_e\sqrt{\frac{1}{n} + \frac{(x-\bar{x})^2}{\sum x^2 - ((\sum x)^2/n)}}$$

Prediction Interval (PI) fpr a specific value of y:

$$PI = \hat{y}^* \pm t_{\alpha/2}s_e\sqrt{1 + \frac{1}{n} + \frac{(x-\bar{x})^2}{\sum x^2 - ((\sum x)^2/n)}}$$

t-test statistic for the regression slope: $t = \dfrac{b_1 - \beta_1}{s_b}$

the standard error of a slope: $s_b = \dfrac{s_e}{\sqrt{\sum x^2 - n(\bar{x})^2}}$

confid. interval for the pop. slope: $CI = b_1 \pm t_{\alpha/2}s_b$

Chapter 15:

mean square regression (MSR): $MSR = SSR/k$

mean square error (MSE): $MSE = SSE/(n-k-1)$

F-test stat. for the overall regression model: $F = \dfrac{MSR}{MSE}$

adjusted multiple coef. of det.: $R_A^2 = 1 - (1-R^2)\dfrac{n-1}{n-k-1}$

variance inflation factor: $VIF_j = \dfrac{1}{1-R_j^2}$

Other Math Rule Reminders:

$$e^x = \exp(x) \quad \text{and} \quad \ln 1 = 0 \quad \text{and} \quad \ln e = 1$$

$$x! = (x)(x-1)(x-2)\cdots(2)(1) \quad \text{and} \quad 0! = 1 \quad \text{and} \quad x^0 = 1$$

Use the output below to answer the appropriate questions in the exam. Be sure to check which table the question references.

ANOVA Table 1

	SS	DF	MS	F	p
Between	54762.268	8	????	_?_?_	0
Within	30917.152	103	300.167		

Here is regression output from a model where home size (in square feet) is the independent variable and home value is the dependent variable. The data are from 1990 in Tarrant County (source, Dielman 2005).

Regression Table 2

Regression Statistics	
R Square	0.6646733
Adjusted R Square	0.6612516
Standard Error	27270.2539058
Observations	100

ANOVA

	SS	DF	MS	F	p
Regression	144458948222.98	1	144458948222.98	194.252	0
Residual	72879341312.41	98	743666748.086		

	coefficients	standard error	t stat	p-value
intercept	−50034.6065597	7422.6774961	−6.74078	0
home size (in square feet)	??	5.2248028	13.93744	0

NAME:____

VERSION A

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. Please verify that your test version and scantron version are the same.

This exam has 25 questions. Cost for turning in exam late: 1st minute is 10 points; 2nd minute is 20 additional points (30 total); 3rd minute is 30 points (60 total) ; 4th minute is 40 points (100 total); 5th minute is 50 points (150 total); 6th minute is 80 points (230 total) and no exams are graded past that point.

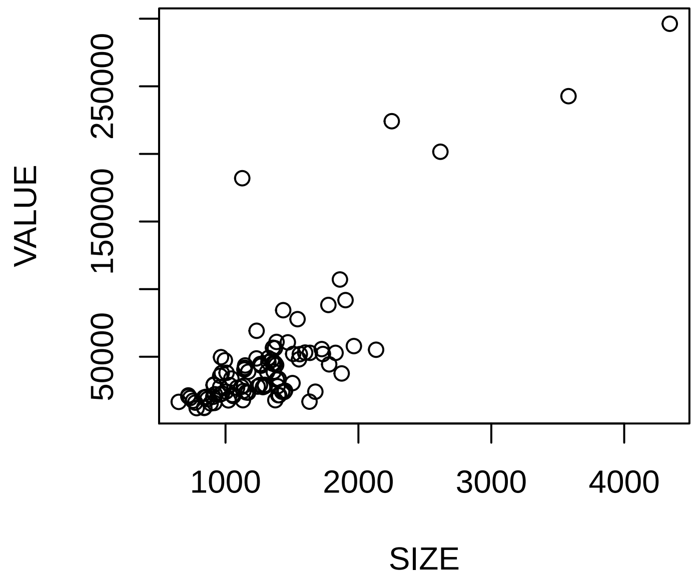
1. I have checked that my ID is bubbled in correctly. If it is bubbled in incorrectly I will get this question wrong. I also understand that questions and their possible answers may run onto the next page and so I should always check the top of the next page for possible answers. I understand that if 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. Consider the null hypothesis $H_0 : \mu = 0$ at the .05 level of significance. The critical value for this test is the same as the critical value(s) for (choose 1 answer, any correct answer will receive credit)

   (a) $H_0 : \mu \geq 0$ at the .1 level.
   (b) the absolute value of the z statistic.
   (c) $H_0 : \mu \geq 0$ at the .025 level.
   (d) $H_0 : \mu = 1$ at the .025 level.
   (e) any test with a p-value below .025.

3. The graph(s) shown here is/are



(a) histograms

(b) stem and leaf displays

(c) scatter plots

(d) box and whiskers plots

4. The probability that a z value is less than 0.65 is

(a) 0.5596177

(b) 0.8749281

(c) 0.7421539

(d) 0.4995077

(e) 0.7095258

5. Consult Table 1. From the table you can conclude that the total sum of squares is ?

(a) 30917.1521129

(b) 42839.7098214

(c) 85679.4196429
(d) −23845.1154171

6. Consult Table 1. From the table you can conclude that the total number of observations used in this analysis/experiment was?

   (a) 110
   (b) 8
   (c) 103
   (d) 112

7. Consult Table 1. From the table what can you conclude concerning the null hypothesis?

   (a) cannot be determined
   (b) depends on the number of observations.
   (c) fail to reject
   (d) rejcet the null

8. Consult Table 1. What is the test statistic?

   (a) 0.
   (b) 11.4024764.
   (c) 6845.2834412.
   (d) 22.8049528.

9. Consult Table 1. What is the critical value for a test at the .05 level?

   (a) 1.55
   (b) 2.13
   (c) 2.34
   (d) 2.03

10. Suppose that the number of homework assigments a professor gives follows a Poisson distribution with a mean of 13. What is the probability of drawing a professor that gives exactly 9 assignments?

   (a) 0.102087

(b) 0.0324072
(c) 0.0873644
(d) 0.066054

11. Suppose that you collect data on apartment prices in Tempe. You look at 40 different apartments and find a mean of 741 and a standard deviation of 160.4. Construct a 95% confidence interval for the mean apartment price. The interval is

    (a) [689.7015913, 792.2984087]
    (b) [693.7015913, 788.2984087]
    (c) [683.7015913, 798.2984087]
    (d) [620.7314322, 713.0685678]

12. Suppose that you collect data on apartment prices in Tempe. You look at 40 different apartments and find a mean of 741 and a standard deviation of 160.4. Test the hypothesis, $H_0 : \mu = 715$ at the .05 level of significance.

    (a) the test statistic is 1.0251773 so we rejcet the null
    (b) the test statistic is 1.0251773 so we fail to reject
    (c) the test statistic is 0.7426596 so we fail to reject
    (d) the test statistic is 1.237695 so we rejcet the null

13. Suppose you have a random variable that is exponentially distributed with a mean of 20. What is the probability of observing a random variable drawn from this distribution with a value of less than 17?

    (a) 0.6394051
    (b) 0.5725851
    (c) 0.493383
    (d) 0.8173165

14. The greater the value of α the greater the risk of failing to reject the null hypothesis when it is true.

    (a) True.
    (b) False.

15. Consider the regression output in Table 2. What is the estimated increase in home value associated with a 1 unit increase in home size (in square feet) ?

(a) 56.0156771
(b) 27270.2539058
(c) 72.8203802
(d) 194.252
(e) 104.0291146

16. Consider the regression output in Table 2. What is the estimated variance of the error term?

    (a) 13635.1269529
    (b) 27270.2539058
    (c) 194.252
    (d) 743666748.08582

17. Consider the regression output in Table 2. What is the percentage of variation in home value that can be explained by the variation in home size (in square feet)?

    (a) −65.4673254%
    (b) 66.4673254%
    (c) 79.7607905%
    (d) 66.1251553%

18. Consider the regression output in Table 2. What is the predicted or estimated home value for a when home size (in square feet) is 1000 square feet?

    (a) 81042.0777971
    (b) 40990.8686881
    (c) 44631.887698
    (d) 22785.7736385
    (e) 15503.7356187

19. Consider the regression output in Table 2. Suppose you want to test the hypothesis that home size (in square feet) is worth \$100 per unit, i.e. $H_0 : \beta_1 = 100$. What is the test statistic for this hypothesis?

    (a) 13.937441
    (b) −5.2020375
    (c) 5.2020375

(d) 6.7626487

(e) −3.6414262

20. Consider the regression output in Table 2. Suppose you want to test the hypothesis that home size (in square feet) has no impact on home value, i.e. $H_0 : \beta_1 = 0$. What is you conclusion for this hypothesis test? (Use $\alpha = .05$.)

    (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) rejcet the null

    (d) fail to reject

21. Suppose you see that for all values of your dependent variable that are above the mean, the value of the independent variable (in a regression) are below the mean. (You can draw a picture if you aren't sure what this looks like).

    (a) This cannot happen because the residuals must average to 0.

    (b) The relationship between the X and Y variables is probably not linear.

    (c) The slope of the regression line must be positive.

    (d) The slope of the regression line must be negative.

    (e) none of the above.

22. Suppose you find the following estimated equation

$$\hat{y} = 12 + 2.3X.$$

    and you find $\hat{y}_1 = 20$ for a specific value X_1. Suppose that you are interested now in finding the predicted value, $\hat{y}_2$ for X_2 where X_2 is twice the value of X_1. What is $\hat{y}_2$?

    (a) 40.8.

    (b) 28.

    (c) 20.

    (d) 36.

    (e) 26.4.

23. In our treatment of regression analysis we made which assumption(s)

    (a) ϵ and X are normally distributed.

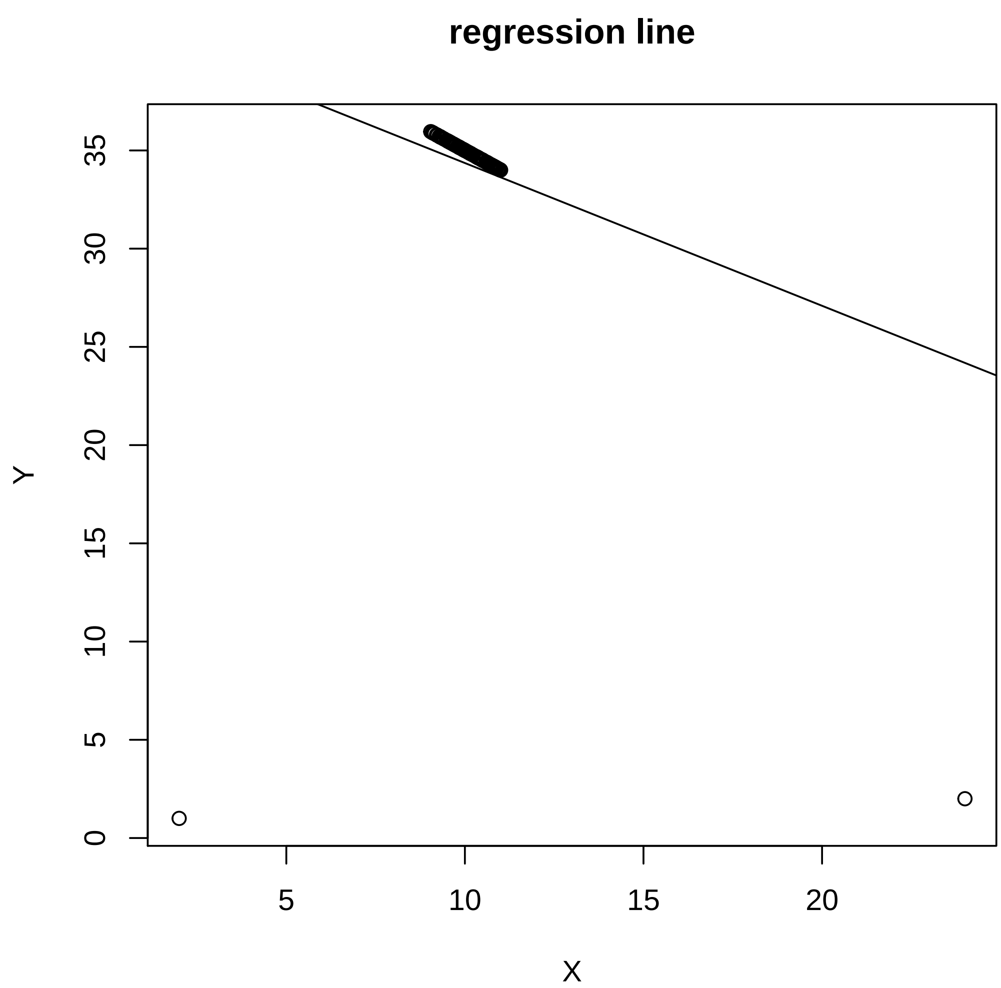
(b) Y is normally distributed.

(c) X is normally distributed.

(d) ϵ is normally distributed.

(e) all of the above.

24. The following graph shows 102 observations and the resulting regression line. Notice that all but 2 observations are close together andthe points representing the 100 close together observations visually merge together to form a thick black line above the regression line. Choose the best option below.



(a) It appears that the residuals have non constant variance.

(b) It appears that the residuals do not have an average of 0.
(c) It appears that the regression line is biased.
(d) It appears that the standard deviation of the residual is around 80 to 100.

25. Suppose that the total sum of squares is 1000 and SSR=800. The R^2 is

(a) 1.25
(b) 200.
(c) .2.
(d) .8.

Bonus question:

26. This is a bonus question from a chapter initially listed on the syllabus but not covered in class. Calculate the test statistic (follows χ^2 distribution) that the proportions for all days are equal, $H_0 : p_m = p_t = p_w = p_{th} = p_f$.

Day	attendance
Monday	233
Tuesday	248
Wednesday	250
Thursday	200
Friday	180

(a) 17.23
(b) 15.5
(c) 21.22
(d) 12.1
(e) 0.93

Key

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