Appendix 17

A17.1a z-test of $p_1 - p_2$ (case 1)

H_0: $p_1 - p_2 = 0$

H_1: $p_1 - p_2 < 0$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Allicin Cold?*	*Placebo Cold?*
4	Sample Proportions		0.3288	0.8904
5	Observations		73	73
6	Hypothesized Difference		0	
7	z Stat		-6.96	
8	P(Z<=z) one tail		0	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0	
11	z Critical two-tail		1.96	

$z = -6.96$; p-value = 0. There is enough evidence to conclude that garlic does help prevent colds?

b. Equal-variances t-test of $\mu_1 - \mu_2$

H_0: $\mu_1 - \mu_2 = 0$

H_1: $\mu_1 - \mu_2 < 0$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*Allicin Days*	*Placebo Days*
4	Mean	6.29	8.11
5	Variance	2.39	4.25
6	Observations	24	65
7	Pooled Variance	3.76	
8	Hypothesized Mean Difference	0	
9	df	87	
10	t Stat	-3.92	
11	P(T<=t) one-tail	0.0001	
12	t Critical one-tail	1.66256	
13	P(T<=t) two-tail	0.0002	
14	t Critical two-tail	1.98761	

t = −3.92; p-value = .0001. There is enough evidence to conclude that garlic reduces the number of days until recovery if a cold is caught

A17.2 t-test of μ_D

H_0: $\mu_D = 0$

H_1: $\mu_D > 0$

$$t = \frac{\bar{x}_D - \mu_D}{s_D / \sqrt{n_D}}$$

	A	B	C
1	t-Test: Paired Two Sample for Means		
2			
3		*Eye-level*	*Lower shelf*
4	Mean	302.4	290.8
5	Variance	2482.2	6262.7
6	Observations	40	40
7	Pearson Correlation	0.7334	
8	Hypothesized Mean Difference	0	
9	df	39	
10	t Stat	1.35	
11	P(T<=t) one-tail	0.0922	
12	t Critical one-tail	1.6849	
13	P(T<=t) two-tail	0.1845	
14	t Critical two-tail	2.0227	

t = 1.35; p-value = .0922. There is not enough evidence to conclude that placement of the product at eye level significantly increases sales?

A17.3 Equal-variances t-test of $\mu_1 - \mu_2$

$H_0: (\mu_1 - \mu_2) = 0$

$H_1: (\mu_1 - \mu_2) < 0$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*British*	*American*
4	Mean	6344.5	6358.3
5	Variance	5084.0	3104.6
6	Observations	28	33
7	Pooled Variance	4010.4	
8	Hypothesized Mean Difference	0	
9	df	59	
10	t Stat	-0.84	
11	P(T<=t) one-tail	0.2010	
12	t Critical one-tail	1.6711	
13	P(T<=t) two-tail	0.4019	
14	t Critical two-tail	2.0010	

$t = -.84$, p-value = .2010. There is not enough evidence to conclude that British courses are shorter than American courses.

A17.4 Chi-squared test of a contingency table

H_0: The two variables are independent

H_1: The two variables are dependent

$$\chi^2 = \sum_{i=1}^{6} \frac{(f_i - e_i)^2}{e_i}$$

	A	B	C	D	E
1	**Contingency Table**				
2					
3		*Group*			
4	*Choice*		1	2	TOTAL
5		1	7	19	26
6		2	8	17	25
7		3	11	14	25
8		TOTAL	26	50	76
9					
10					
11		chi-squared Stat			1.73
12		df			2
13		p-value			0.4206
14		chi-squared Critical			5.9915

$\chi^2 = 1.73$, p-value = .4206. There is not enough evidence to infer that there is a relationship between choices students make and their level of intoxication.

A17.5 t-test of ρ or β_1

$$H_0: \rho = 0$$

$$H_1: \rho < 0$$

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

	A	B	C	D
1	**Correlation**			
2				
3	*Repair cost and Credit score*			
4	Pearson Coefficient of Correlation			-0.3830
5	t Stat			-6.11
6	df			217
7	P(T<=t) one tail			0
8	t Critical one tail			1.6519
9	P(T<=t) two tail			0
10	t Critical two tail			1.9710

$t = -6.11$; p-value = 0. There is enough evidence to infer that as the credit score increases the repair cost decreases.

A17.6 z-estimator of p

$$\hat{p} \pm z_{\alpha/2}\sqrt{\hat{p}(1-\hat{p})/n}$$

	A	B
1	**z-Estimate: Proportion**	
2		*Photography*
3	Sample Proportion	0.124
4	Observations	283
5	LCL	0.085
6	UCL	0.162

Confidence interval estimate of the total number of American adults who participate in photography

LCL = 205.8 million (.085) = 17.493 million

UCL = 205.8 million (.162) = 33.396 million

A17.7 z-test of $p_1 - p_2$ (case 1)

$$H_0: p_1 - p_2 = 0$$

$$H_1: p_1 - p_2 > 0$$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Compression*	*Compression & breaths*
4	Sample Proportions		0.221	0.0997
5	Observations		439	712
6	Hypothesized Difference		0	
7	z Stat		5.6587	
8	P(Z<=z) one tail		0	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0	
11	z Critical two-tail		1.96	

z = 5.66; p-value = 0. There is overwhelming evidence to infer that the survival rate is greater with compression only than with compression and breaths.

A17.8 Ch-squared test of a contingency table

H_0 : The two variables are independent

H_1 : The two variables are dependent

$$\chi^2 = \sum_{i=1}^{12} \frac{(f_i - e_i)^2}{e_i}$$

	A	B	C	D	E
1	**Contingency Table**				
2					
3		*Age category*			
4	*Mutual fund*		1	2	TOTAL
5		1	19	6	25
6		2	75	57	132
7		3	92	123	215
8		4	89	109	198
9		5	63	77	140
10		6	73	43	116
11		TOTAL	411	415	826
12					
13					
14		chi-squared Stat			24.84
15		df			5
16		p-value			0.0001
17		chi-squared Critical			11.0705

$\chi^2 = 24.84$; p-value = .0001. There is enough evidence to infer that the age of the head of the household is related to whether he or she owns mutual funds.

A17.9 Equal-variances t-test of $\mu_1 - \mu_2$

$H_0: (\mu_1 - \mu_2) = 0$

$H_1: (\mu_1 - \mu_2) > 0$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*Year 1995*	*Year 2005*
4	Mean	66.37	64.67
5	Variance	64.24	64.71
6	Observations	417	520
7	Pooled Variance	64.50	
8	Hypothesized Mean Difference	0	
9	df	935	
10	t Stat	3.22	
11	P(T<=t) one-tail	0.0007	
12	t Critical one-tail	1.6465	
13	P(T<=t) two-tail	0.0013	
14	t Critical two-tail	1.9625	

t = 3.22; p-value = .0007. There is enough evidence to infer that the ages of people who require hip replacements are getting smaller?

A17.10 Chi-squared test of a contingency table

H_0: The two variables are independent

H_1: The two variables are dependent

$$\chi^2 = \sum_{i=1}^{8} \frac{(f_i - e_i)^2}{e_i}$$

	A	B	C	D	E
1	**Contingency Table**				
2					
3		*Weight category*			
4	*Hip/Knee*		1	2	TOTAL
5		1	9	6	15
6		2	113	60	173
7		3	184	166	350
8		4	165	272	437
9		TOTAL	471	504	975
10					
11					
12		chi-squared Stat			42.89
13		df			3
14		p-value			0
15		chi-squared Critical			7.8147

$\chi^2 = 42.89$; p-value = 0. There is enough evidence to conclude that weight and the joint needing replacement are related.

A17.11 One-way analysis of variance and multiple comparisons

After the show

	A	B	C	D	E	F	G
10	ANOVA						
11	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
12	Between Groups	24.71	2	12.35	5.12	0.0067	3.03
13	Within Groups	567.11	235	2.41			
14							
15	Total	591.82	237				

F = 5.12; p-value = .0067. There is enough evidence to infer that there are differences in memory recall immediately after the show between the three groups.

	A	B	C	D	E
1	**Multiple Comparisons**				
2					
3				LSD	Omega
4	Treatment	Treatment	Difference	Alpha = 0.0167	Alpha = 0.05
5	*G1 After*	*G2 After*	-0.152	0.594	0.577
6		*G3 After*	-0.747	0.594	0.577
7	*G2 After*	*G3 After*	-0.595	0.596	0.577

Using Tukey's method group 3 differs from both groups 1 and 2.

24 hours later

	A	B	C	D	E	F	G
10	ANOVA						
11	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
12	Between Groups	36.90	2	18.45	9.06	0.0002	3.03
13	Within Groups	478.53	235	2.04			
14							
15	Total	515.43	237				

F = 9.06; p-value = .0002. There is enough evidence to infer that there are differences in memory recall 24 hours after the show between the three groups.

	A	B	C	D	E
1	**Multiple Comparisons**				
2					
3				LSD	Omega
4	Treatment	Treatment	Difference	Alpha = 0.0167	Alpha = 0.05
5	*G1 24 hrs*	*G2 24 hrs*	-0.026	0.546	0.530
6		*G3 24 hrs*	-0.849	0.546	0.530
7	*G2 24 hrs*	*G3 24 hrs*	-0.823	0.547	0.530

Using either method group 3 differs from both groups 1 and 2.

A17.12

	A	B	C	D	E	F
1	SUMMARY OUTPUT					
2						
3	*Regression Statistics*					
4	Multiple R	0.8415				
5	R Square	0.7081				
6	Adjusted R Square	0.7021				
7	Standard Error	213.7				
8	Observations	100				
9						
10	ANOVA					
11		*df*	*SS*	*MS*	*F*	*Significance F*
12	Regression	2	10,744,454	5,372,227	117.6	0.0000
13	Residual	97	4,429,664	45,667		
14	Total	99	15,174,118			
15						
16		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	
17	Intercept	576.8	514.0	1.12	0.2646	
18	Space	90.61	6.48	13.99	0.0000	
19	Water	9.66	2.41	4.00	0.0001	

a The regression equation is $\hat{y} = 576.8 + 90.61x_1 + 9.66x_2$

b The coefficient of determination is $R^2 = .7081$; 70.81% of the variation in electricity consumption is explained by the model. The model fits reasonably well.

c $H_0: \beta_1 = \beta_2 = 0$

H_1: At least one β_i is not equal to zero

F = 117.6, p-value = 0. There is enough evidence to conclude that the model is valid.

d & e

	A	B	C	D
1	**Prediction Interval**			
2				
3			Consumption	
4				
5	Predicted value		8175	
6				
7	Prediction Interval			
8	Lower limit		7748	
9	Upper limit		8601	
10				
11	Interval Estimate of Expected Value			
12	Lower limit		8127	
13	Upper limit		8222	

e We predict that the house will consume between 7748 and 8601 units of electricity.

f We estimate that the average house will consume between 8127 and 8222 units of electricity.

A17.13Wages: Equal-variances t-test of $\mu_1 - \mu_2$

$H_0: (\mu_1 - \mu_2) = 0$

$H_1: (\mu_1 - \mu_2) \neq 0$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*Goods wages*	*Service wages*
4	Mean	18.66	16.78
5	Variance	11.54	10.05
6	Observations	395	463
7	Pooled Variance	10.74	
8	Hypothesized Mean Difference	0	
9	df	856	
10	t Stat	8.37	
11	P(T<=t) one-tail	1.12E-16	
12	t Critical one-tail	1.6466	
13	P(T<=t) two-tail	2.24E-16	
14	t Critical two-tail	1.9627	

t = 8.37; p-value = 0. There is overwhelming evidence to conclude that goods-producing firms pay high wages than services-producing firms.

Benefits: Unequal-variances t-test of $\mu_1 - \mu_2$

$$H_0 : (\mu_1 - \mu_2) = 0$$

$$H_1 : (\mu_1 - \mu_2) \neq 0$$

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

	A	B	C
1	t-Test: Two-Sample Assuming Unequal Variances		
2			
3		*Goods benefits*	*Service benefits*
4	Mean	9.82	6.34
5	Variance	3.91	1.03
6	Observations	395	463
7	Hypothesized Mean Difference	0	
8	df	567	
9	t Stat	31.59	
10	P(T<=t) one-tail	2.10E-127	
11	t Critical one-tail	1.6475	
12	P(T<=t) two-tail	4.19E-127	
13	t Critical two-tail	1.9642	

t = 31.59; p-value = 0. There is overwhelming evidence to conclude that goods-producing firms provide larger benefits than services-producing firms.

A17.14 Multiple regression, test of coefficients

$$t = \frac{b_i - \beta_i}{s_{b_i}}$$

The ordinary multiple regression model fit quite well. The coefficient of determination is .7042 and the p-value of the F-test is 0. However, no independent variable is linearly related to salary. This is a clear sign of multicollinearity. Stepwise regression was used with the outcome shown below.

The only independent variables that are linearly related to salary are assists in 1992-93 and goals in 1992-93. It appears that players' salaries are most strongly related to the number of goals and the number of assists in the previous season.

	M	N	O	P	Q	R	S
1	**Results of stepwise regression**						
2							
3	**Step 1 - Entering variable: Ast92_93**						
4							
5	Summary measures						
6		Multiple R	0.7725				
7		R-Square	0.5967				
8		Adj R-Square	0.5883				
9		StErr of Est	380046.1250				
10							
11	ANOVA Table						
12		Source	df	SS	MS	F	p-value
13		Explained	1	10258242603399.2000	10258242603399.2000	71.0232	0.0000
14		Unexplained	48	6932882522112.0000	144435052544.0000		
15							
16	Regression coefficients						
17			Coefficient	Std Err	t-value	p-value	
18		Constant	38325.8711	82112.9297	0.4667	0.6428	
19		Ast92_93	25746.7754	3055.0806	8.4275	0.0000	
20							
21	**Step 2 - Entering variable: Goal92_93**						
22							
23	Summary measures			Change	% Change		
24		Multiple R	0.8086	0.0361	%4.7		
25		R-Square	0.6538	0.0571	%9.6		
26		Adj R-Square	0.6390	0.0507	%8.6		
27		StErr of Est	355859.9375	-24186.1875	-%6.4		
28							
29	ANOVA Table						
30		Source	df	SS	MS	F	p-value
31		Explained	2	11239219530119.2000	5619609765059.6100	44.3760	0.0000
32		Unexplained	47	5951905595392.0000	126636289263.6600		
33							
34	Regression coefficients						
35			Coefficient	Std Err	t-value	p-value	
36		Constant	65924.4297	77524.0313	0.8504	0.3994	
37		Ast92_93	14124.2783	5061.7593	2.7904	0.0076	
38		Goal92_93	18523.1426	6655.2490	2.7832	0.0077	

A17.15One-way analysis of variance

$$H_0 : \mu_1 = \mu_2 = \mu_3$$

Weight gain

	A	B	C	D	E	F	G
10	ANOVA						
11	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
12	Between Groups	608.6	2	304.32	10.47	3.73E-05	3.02
13	Within Groups	11337	390	29.07			
14							
15	Total	11946	392				

F = 10.47; p-value = 0. There is enough evidence to infer that there are differences in weight gain between the three groups.

	A	B	C	D	E
1	**Multiple Comparisons**				
2					
3				LSD	Omega
4	Treatment	Treatment	Difference	Alpha = 0.0167	Alpha = 0.05
5	*G 1 Weight gain*	*G 2 weight gain*	0.46	1.47	2.02
6		*G 3 weight gain*	-3.95	2.24	2.02
7	*G 2 weight gain*	*G 3 weight gain*	-4.42	2.40	2.02

Group 3 (quitters) is different from groups 1 and 2.

Systolic blood pressure increase

	A	B	C	D	E	F	G
10	ANOVA						
11	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
12	Between Groups	929.6	2	464.78	1.67	0.1898	3.02
13	Within Groups	108622	390	278.52			
14							
15	Total	109552	392				

F = 1.67; p-value = .1898. There is not enough evidence to conclude that there are differences in systolic blood pressure increase between the three groups.

Diastolic blood pressure increase

	A	B	C	D	E	F	G
10	ANOVA						
11	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
12	Between Groups	676.5	2	338.24	4.80	0.0087	3.02
13	Within Groups	27463	390	70.42			
14							
15	Total	28139	392				

F = 4.80; p-value = .0087. There is enough evidence to infer that there are differences in the diastolic blood pressure increase between the three groups.

	A	B	C	D	E
1	**Multiple Comparisons**				
2					
3				LSD	Omega
4	Treatment	Treatment	Difference	Alpha = 0.0167	Alpha = 0.05
5	*G1 DBP gain*	*G2 DBP gain*	-2.57	2.28	3.15
6		*G3 DBP gain*	-2.99	3.48	3.15
7	*G2 DBP gain*	*G3 DBP gain*	-0.42	3.73	3.15

Using Tukey’s method no groups differ. Using the Bonferroni adjustment of the LSD method groups 1 and 2 differ only.

A17.16 t-estimator of μ

$$\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

	A	B	C	D
1	**t-Estimate: Mean**			
2				
3				*Acres*
4	Mean			676.1
5	Standard Deviation			140.5
6	LCL			664.1
7	UCL			688.2

Estimate of total farmland:

LCL = 229,373(664.1) = 152,326,609 acres

UCL = 229,373(688.2) = 157,854,499 acres

Case A17.1

Test of diameters:

Equal-variances t-test of $\mu_1 - \mu_2$

$$H_0: (\mu_1 - \mu_2) = 0$$

$$H_1: (\mu_1 - \mu_2) \neq 0$$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*Metal*	*Paclitaxel*
4	Mean	3.01	3.00
5	Variance	0.0655	0.0667
6	Observations	652	662
7	Pooled Variance	0.0661	
8	Hypothesized Mean Difference	0	
9	df	1312	
10	t Stat	0.58	
11	P(T<=t) one-tail	0.2818	
12	t Critical one-tail	1.6460	
13	P(T<=t) two-tail	0.5637	
14	t Critical two-tail	1.9618	

t = .58, p-value = .5637. There is no evidence of a difference in vessel diameters between the two groups of patients.

Test of lengths

Equal-variances t-test of $\mu_1 - \mu_2$

$$H_0 : (\mu_1 - \mu_2) = 0$$

$$H_1 : (\mu_1 - \mu_2) \neq 0$$

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

	A	B	C
1	t-Test: Two-Sample Assuming Equal Variances		
2			
3		*Metal*	*Paclitaxel*
4	Mean	19.93	19.92
5	Variance	9.13	8.61
6	Observations	652	662
7	Pooled Variance	8.87	
8	Hypothesized Mean Difference	0	
9	df	1312	
10	t Stat	0.06	
11	P(T<=t) one-tail	0.4772	
12	t Critical one-tail	1.6460	
13	P(T<=t) two-tail	0.9545	
14	t Critical two-tail	1.9618	

t = .06, p-value = .9545. There is no evidence of a difference in lesion lengths between the two groups of patients.

Inadequate blood flow

z-test of $p_1 - p_2$ (case 1)

$$H_0 : (p_1 - p_2) = 0$$

$$H_1 : (p_1 - p_2) > 0$$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Metal*	*Paclitaxel*
4	Sample Proportions		0.1196	0.0468
5	Observations		652	662
6	Hypothesized Difference		0	
7	z Stat		4.78	
8	P(Z<=z) one tail		0	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0	
11	z Critical two-tail		1.96	

z = 4.78, p-value = 0. There is enough evidence to conclude that the paclitaxel stent results in a lower incidence of inadequate blood flow.

Blockage reoccurrence

z-test of $p_1 - p_2$ (case 1)

$$H_0: (p_1 - p_2) = 0$$

$$H_1: (p_1 - p_2) > 0$$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Metal*	*Paclitaxel*
4	Sample Proportions		0.1120	0.0302
5	Observations		652	662
6	Hypothesized Difference		0	
7	z Stat		5.78	
8	P(Z<=z) one tail		0	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0	
11	z Critical two-tail		1.96	

z = 5.78, p-value = 0. There is enough evidence to conclude that the paclitaxel stent results in a lower incidence of blockage reoccurrence.

Death from cardiac causes

z-test of $p_1 - p_2$ (case 1)

$$H_0: (p_1 - p_2) = 0$$

$$H_1: (p_1 - p_2) > 0$$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Metal*	*Paclitaxel*
4	Sample Proportions		0.0475	0.0423
5	Observations		652	662
6	Hypothesized Difference		0	
7	z Stat		0.46	
8	P(Z<=z) one tail		0.3229	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0.6458	
11	z Critical two-tail		1.96	

z = .46, p-value = .3229. There is not enough evidence to conclude that the paclitaxel stent results in a lower incidence of death from cardiac causes.

Death from blockage

z-test of $p_1 - p_2$ (case 1)

$$H_0: (p_1 - p_2) = 0$$

$$H_1: (p_1 - p_2) > 0$$

$$z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

	A	B	C	D
1	**z-Test: Two Proportions**			
2				
3			*Metal*	*Paclitaxel*
4	Sample Proportions		0.0061	0.0076
5	Observations		652	662
6	Hypothesized Difference		0	
7	z Stat		-0.31	
8	P(Z<=z) one tail		0.3777	
9	z Critical one-tail		1.6449	
10	P(Z<=z) two-tail		0.7554	
11	z Critical two-tail		1.96	

z = –.31, p-value = 1–.3777 = .6223. There is not enough evidence to conclude that the paclitaxel stent results in a lower incidence of death from blockage.

Case A17.2 a Chi-squared test of a contingency table

H_0 : The two variables are independent

H_1 : The two variables are dependent

$$\chi^2 = \sum_{i=1}^{15} \frac{(f_i - e_i)^2}{e_i}$$

	A	B	C	D	E	F
1	**Contingency Table**					
2						
3		*Age*				
4	*Status*		1	2	3	TOTAL
5		1	509	354	4	867
6		2	611	413	5	1029
7		3	614	437	5	1056
8		4	567	402	5	974
9		5	634	483	12	1129
10		TOTAL	2935	2089	31	5055
11						
12						
13		chi-squared Stat			6.88	
14		df			8	
15		p-value			0.5496	
16		chi-squared Critical			15.5073	

$\chi^2 = 6.88$, p-value = .5496. There is not enough evidence to conclude that there is a relationship between age category and medical status of the driver.

b z-estimate of p

$$\hat{p} \pm z_{\alpha/2}\sqrt{\hat{p}(1-\hat{p})/n}$$

	A	B
1	**z-Estimate: Proportion**	
2		*Status*
3	Sample Proportion	0.5806
4	Observations	5055
5	LCL	0.5670
6	UCL	0.5942

The estimate of the proportion of drivers uninjured is between .5670 and .5942.

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