ANSWERS CHAPTER 12

THINK IT OVER

think it over

TIO 12.1: One sample does not influence the other.

TIO 12.2: Because we are looking at 'equal to' and 'not equal to'.

TIO 12.3:

$$\begin{split} H_{0}: \mu_{1} - \mu_{2} &\leq D_{0} \\ H_{1}: \mu_{1} - \mu_{2} &> D_{0} \text{ two-tailed} \\ H_{0}: \mu_{1} - \mu_{2} &= D_{0} \\ H_{1}: \mu_{1} - \mu_{2} &\neq D_{0} \text{ one-tailed} \\ H_{0}: \mu_{1} - \mu_{2} &\geq D_{0} \\ H_{1}: \mu_{1} - \mu_{2} &< D_{0} \end{split}$$

TIO 12.4: There is no difference between incomes. The investigation therefore is pointless.

TIO 12.5: You would get positive values.

TIO 12.6: No answer required.

TIO 12.7: p_1 says that 9% of doughnuts from factory 1 are probably bad and p_2 says that 7.5% from factory 2 are probably bad based on the samples taken. The point estimate is the value we use to represent the difference between a range of samples, if we had taken lots of different samples. It is the value we guess will be the difference between the means of lots of samples.

TIO 12.8: Is the quality of the doughnuts in each factory the same? We can be 95% confident that if we took lots of samples from both factories, the difference between the means of the quality of the doughnuts would be within a range of \pm 5.4% of each other. If this tolerance is acceptable, then the factories are producing similar quality doughnuts.

EXERCISES

- 1. (a) $H_0: \mu_1 \mu_2 \ge 0, H_1: \mu_1 \mu_2 < 0.$
 - (b) -1.56.
 - (c) 87 *df*, between 0.1 and 0.05.
 - (d) Reject null and conclude health service salaries are lower.
- 2. Margin of error = 39, upper limit = 284, lower limit = 205.

Mean factory A	=AVERAGE(A2:A125)
Pop SD	200
Mean factory B	=AVERAGE(B2:B125)
Pop SD	100
Margin of error	=1.96*(SQRT((E3^2/124)+(E7^2/124)))
Lower limit	=(E2–E6)–E9
Upper limit	=(E2–E6)+E9

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	А	В	С	D	E		F
1	Factory A	Factory B					
2	2245	513		Mean factory A		1493	
3	1794	2444		Pop SD		200	
4	2253	346					
5	2895	1876					
6	91	706		Mean factory B		1249	
7	866	994		Pop SD		100	
8	646	491					
9	1025	518		Margin of error		39	
10	867	1743					
11	1575	2490		Lower limit		205	
12	383	220		Upper limit		284	
13	2290	179					
14	2154	2015					
15	591	1467					
16	1861	1347					
17	545	66					
18	1609	967	,				
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3 38 33 4 24 35 5 38 58 6 38 36 7 39 26 8 13 21 9 36 18 10 10 40 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	5 No of samples B	80	Mean of diff	-21		Margin of error	9.24217				
4 24 35 5 38 58 6 38 36 7 39 26 8 13 21 9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	11	80	SD of differe	31.3182		Lower confidence	-30.50				
5 38 58 6 38 36 7 39 26 8 13 21 9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	-11					Upper confidence	-12.02				
6 38 36 7 39 26 8 13 21 9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	-20 t-Test: Paired Two Sample	for Means									
7 39 26 8 13 21 9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	2										
8 13 21 9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	13	Variable 1	Variable 2								
9 36 18 10 10 40 11 16 65 12 43 84 13 29 10 14 41 36 15 10 2 16 4 51	-8 Mean	24.838	46.1								
0 10 40 1 16 65 2 43 84 3 29 10 4 41 36 5 10 2 6 4 51	18 Variance	206.037	885.078								
1 16 65 2 43 84 3 29 10 4 41 36 5 10 2 6 4 51	-30 Observations	80.000	80								
2 43 84 3 29 10 4 41 36 5 10 2 6 4 51	-49 Pearson Correlation	0.129									
3 29 10 4 41 36 5 10 2 6 4 51	-41 Hypothesized Mean Differe	ence 0.000									
4 41 36 5 10 2 6 4 51	19 df	79.000									
16 4 51	5 t Stat	-6.072									
4 51	8 P(I<=t) one-tail	0.000									
17 10 10	-47 t Critical one-tail	2.574									
9 4 17	12 Critical two tail	2.640									
0 8 32	-24	2.040									
7 21	-14										
21 15 5	10										
22 45 81											

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1	C	D	E	F	G	Н	1	J
1 2 3 4	Difference =A2-B2 =A3-B3 =A4-B4	No of samples A No of samples B	=COUNT(B2:B101) =COUNT(B2:B81)	Mean of differences SD of differences	=AVERAGE(C2:C81) =STDEV.S(C2:C81)	Margin of error Lower confidence	=E18*G3/SQRT(E2) =G2-I2 =G2+I2	
5	-45.85	t-Test: Paired Two Sample for Means				opper connucrice	- OL TIL	
6	=A6-B6	c restit and a rise sample for means						
7	=A7.87		Variable 1	Variable 2				
8	=A8-B8	Mean	24.8375	46.1				
9	=A9-B9	Variance	206.036550632911	885.078481012658				
10	=A10-B10	Observations	80	80				
11	=A11-B11	Pearson Correlation	0.129130152129992					
12	=A12-B12	Hypothesized Mean Difference	0					
13	=A13-B13	df	79					
14	=A14-B14	t Stat	-6.07243228913185					
15	=A15-B15	P(T<=t) one-tail	2.07627518646637E-08					
16	=A16-B16	t Critical one-tail	2.37448159693697					
17	=A17-B17	P(T<=t) two-tail	4.15255037293275E-08					
18	=A18-B18	t Critical two-tail	2.63950462745322					
19	=A19-B19							
20	=A20-B20							
21	=A21-B21							
22	=A22-B22							
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