Exercises with t-test

1. Georgia Southern Student Data

Students at Georgia Southern were asked to complete a cyber-harassment questionnaire. A number of constructs were included on this questionnaire and three were selected for this exercise:

- (1) life satisfaction: degree to which respondent is satisfied with life
- (2) socially connected: degree to which respondent believes they are socially connected with friends
- (3) Stress: amount of stress respondent experiences daily

For each construct the response scales range from 1 = low to 5 = high, so higher scores indicate more life satisfaction, more social connections, and more stress.

The total sample included several hundred responses, but the first 10 females and 10 male responses are reported below in Table 1.

Table 1: Data for Life Satisfaction, Social Connections, Stress, and Sex							
	Life	Socially		Sex			
Respondent	Satisfaction	Connected	Stress	(1 = female, 2 = male)			
1	3.20	3.67	2.83	1			
2	4.00	4.67	1.83	1			
3	2.80	3	3.67	1			
4	3.60	2	2.33	1			
5	2.80	3.33	3.00	1			
6	3.80	2.67	3.00	1			
7	3.20	3.67	2.67	1			
8	3.60	2.67	2.50	1			
9	3.80	3.67	1.67	1			
10	3.60	1.33	3.17	1			
11	3.40	2.33	2.33	2			
12	3.20	2.33	2.83	2			
13	3.40	4	2.83	2			
14	2.80	4	2.50	2			
15	2.60	1.67	3.83	2			
16	3.60	2.67	3.00	2			
17	3.00	5	3.00	2			
18	4.40	3	1.67	2			
19	4.40	2.67	2.67	2			
20	2.40	2.33	4.17	2			

2. Life Satisfaction Compared by Sex

Is there a difference in life satisfaction between female and male college students at Georgia Southern? Using the t-test Excel spreadsheet, enter the above data for life satisfaction by sex and

- (a) find the life satisfaction means for both groups,
- (b) p-value and t-test for this difference,
- (c) indicate whether the difference is statistically significant at the .05 level (i.e., is the null rejected), and
- (d) write a one or two sentence interpretation of the results.

3. Temperature in Statesboro, June and July 2016

Is there a difference in mean Fahrenheit in Statesboro during the months of June and July? Below are recorded high temperatures for 10 randomly selected days from June and July 2016. Using the t-test Excel spreadsheet, enter the temperature data and

(a) find the temperature means for both months,

- (b) p-value and t-test for this difference,
- (c) indicate whether the difference is statistically significant at the .05 level (i.e., is the null rejected), and
- (d) write a one or two sentence interpretation of the results.

July High			
92			
96			
97			
96			
97			
95			
93			
96			
98			
96			

Answers are provided below.

Answers

2. Life Satisfaction Compared by Sex

The screen shot below shows the t-test results for life satisfaction compared by sex. Females are in the column for Group One and males in the column for Group Two.

(a) find the life satisfaction means for both groups,

(b) p-value and t-test for this difference,

(c) indicate whether the difference is statistically significant at the .05 level (i.e., is the null rejected), and

(d) write a one or two sentence interpretation of the results.

Results:

- (a) Female M = 3.44, Male M = 3.32
- (b) t = 0.47, p-value = .64
- (c) The mean difference is not statistically significant at the .05 level
- (d) Brief interpretation

There is not a statistically significant mean difference in life satisfaction between females and males. Results show that both females and males report similar levels of life satisfaction with means of 3.44 and 3.32 on a 1 to 5 scale. On average students are more satisfied with life than dissatisfied since the mean scores are near the middle of the scale.

	А	В	C D	E	F	G	Н	- I
1	Enter Data Below	w (up to 300)						
2	Group One	Group Two		Group One	Group Two			
3	3.2	3.4	Mean =	3.44	3.32			
4	4	3.2	Standard Deviation =	0.41952354	0.68117545			
5	2.8	3.4	Variance =	0.176	0.464			
6	3.6	2.8	Sample size, n =	10	10			
7	2.8	2.6						
8	3.8	3.6	Pooled Variance =	0.32				
9	3.2	3	SE of Mean Difference =	0.25298221	Note: Standard error (SE) of mean difference			ifference
10	3.6	4.4	Mean Difference =	0.12				
11	3.8	4.4	degrees of freedom =	18				
12	3.6	2.4						
13			t -ratio =	0.47434165				
14			p-value for t =	0.640960				
15								

3. Temperature in Statesboro, June and July 2016

The screen shot below shows the t-test results for temperature by month. June readings are in Group One column and July in Group Two.

Results:

(a) June M = 90.8, July M = 95.6

(b) t = -2.43, p-value = .025

(c) The mean difference is statistically significant at the .05 level

(d) Brief interpretation

There is a statistically significant mean difference in recorded high Fahrenheit readings between June and July of 2016 in Statesboro. June was almost 5 degrees cooler than July.

	А	В	C D	E	F	G	Н	I
1	Enter Data Below (up to 300)							
2	Group One	Group Two		Group One	Group Two			
3	95	92	Mean =	90.8	95.6			
4	93	96	Standard Deviation =	5.95911999	1.83787317			
5	91	97	Variance =	35.5111111	3.37777778			
6	92	96	Sample size, n =	10	10			
7	85	97						
8	94	95	Pooled Variance =	19.4444444				
9	95	93	SE of Mean Difference =	1.97202659	Note: Standard error (SE) of mean difference			ference
10	93	96	Mean Difference =	-4.8				
11	76	98	degrees of freedom =	18				
12	94	96						
13			t -ratio =	-2.4340443				
14			p-value for t =	0.025572				
15								