Review of Basic Statistical Concepts
Self-Assessment Exam

Solutions

1.

a. The population is all 293,683,456 people.
b. The parameter of interest is p, the proportion of 293,683,456 people who read a book in 2002.
c. The sample is a random selection of 17000 adults.
d. The statistic is the proportion $\hat{p}$ of the sample of 17000 adults who read a book in 2002. The value of the sample proportion is 0.57.

2.

a. 2.15
b. 2.06
c. 1.82

3.

a. The t-multiplier is 2.57

95% confidence interval is

$$\bar{x} \pm t_{\alpha/2,n-1}\left(\frac{s}{\sqrt{n}}\right)$$

= -8±2.57*1.1547

=-8±2.968

=(-10.968, -5.032)

The confidence interval is the same as the output of Minitab.

b. We can be 95% confident that the mean weight changes in a herd of calves is between -10.968 and -5.032.

4.

a. $H_0 : \mu = 88$

$H_A : \mu < 88$

b. $\alpha = 0.05$

c. The critical value $-t_{0.05,24}$ is -1.71.

$$t^* = \frac{\bar{x}-\mu}{s/\sqrt{n}}$$

=(83-88)5/10

=-2.5

Since t^* is less than -1.71, we reject the null hypothesis.

d. p value is 0.0098

Since 0.0098<0.05, we reject the null hypothesis.

5.

Expected counts are printed below observed counts
Chi-Square contributions are printed below expected counts

	C2	C3	C4	C5	Total
1	15	32	18	5	70
	7.78	26.25	21.39	14.58	
	6.706	1.260	0.537	6.298	
2	8	29	23	18	78
	8.67	29.25	23.83	16.25	
	0.051	0.002	0.029	0.188	
3	1	20	25	22	68
	7.56	25.50	20.78	14.17	
	5.688	1.186	0.858	4.331	
Total	24	81	66	45	216

Chi-Sq = 27.135, DF = 6, P-Value = 0.000

Since p-value is smaller than 0.05, we reject null hypothesis and conclude that the severity of the disease is dependent on the age of the patient.

6.

$H_0 : P_f = 0.55$

$H_A : P_f \neq 0.55$

$\chi^2 = 0.1616$

The critical value of χ^2 with 1 degree of freedom is 3.84. Since 0.1616 < 3.84, we can not reject the null hypothesis and conclude that the sample is representative of the population.

7.

Power is 0.9988

8.

N=6

9.

Here, we want to test

H_0: p=0.44
H_A: p>0.44

The test statistic *Z=4.03. Since 4.03 is greater than the critical value 1.645, we will reject* the null hypothesis . There is sufficient evidence to indicate that the percentage of students engaging in binge drinking at the university is greater than the percentage found in national survey.

10.

Here, we want to test

H_0: p=0.5
H_A: p>0.5

The test statistic *Z=-1.5, the p-value is 0.93.Since 0.93 is greater than 0.05, we can not reject the null hypothesis.* There is not sufficient evidence to support the claim " Larger than half of American adults think that humans developed from earlier species of animals".