Homework 6 Solution

Sta113, ISDS

March 24, 2003

Total 18 points.

8.76

3 points

- a. $\overline{y} = 84.84$.
- b. Notice $z_{\alpha/2} = 1.96$ from Table 4 in the text. And the confidence interval is $\overline{y} \pm z_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$.
- c. The confidence coefficient is 0.95. If repeated samples were selected and a 95% confidence interval for μ was constructed for each sample, then 95% of the intervals so construted would contain μ.

8.78

2 points

- Let μ_1 and μ_2 be the mean time between failures of disk drive 1 and disk drive 2 respectively. Then the confidence interval for $(\mu_1 - \mu_2)$ is $(\overline{y_1} - \overline{y_2}) \pm t_{\alpha/2}\sqrt{s_p^2(1/n_1 + 1/n_2)}$ where $s_p^2 = \frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}$. Therefore we can get the 95% confidence interval $(-27.58, -4.42)$. Hence we believe the mean time between failures of disk drive 2 is longer than the mean time between failures of disk drive 1.

8.82

1 point

- First compute the differences, d_i. Then the confidence interval would be $\overline{d} \pm t_{\alpha/2} s_d/\sqrt{n}$, where $\overline{d} = \sum d_i/n$ and $s_d^2 = \frac{\sum (d_i - \overline{d})^2}{n-1}$. Therefore we can get the 95% confidence interval $(-1.195, 3.945)$.

8.85

4 points

- a. -4.8 ± 5 (Test on Page 374) or -4.8 ± 5.237876 (Test On Page 377)
- b. If you are doing test on Page 374. then three assumptions: 1. Both of the populations from which the samples are selected have relative frequency distributions that are approximately normal; 2. The variances are equal; 3. The random samplese are selected independently from the two populations. If you are doing test on Page 377, then two assumptions: 1. Both of the populations from which the samples are selected have relative frequency distributions that are approximately normal; 2. The random samplese are selected independently from the two populations.
- c. No.
- d. 74

9.3

3 points.

- a. Type II
- b. Type I
- c. Type I error will result in waste of time and money. Type II error will result in that we may miss some useful drugs. In expaining your conclusion, clear state which factor is more important in your point of view.

9.5

3 points

- $\alpha = P(RejectH_0|p = 0.1) = 1 - \sum_{i=0}^{5} \binom{25}{i} 0.1^i 0.9^{25-i} = 0.033.$
- $\beta = 1 - P(RejectH_0|p = 0.2) = \sum_{i=0}^{5} \binom{25}{i} 0.2^i 0.8^{25-i} = 0.617.$
- $\beta = 1 - P(RejectH_0|p = 0.4) = \sum_{i=0}^{5} \binom{25}{i} 0.4^i 0.6^{25-i} = 0.029.$

9.14

1 point

- We test $H_0 : \mu = 4$ vs $H_1 : \mu > 4$.

9.21

1 point

- We test $H_0 : \mu = 75$ vs $H_1 : \mu \neq 75$. The test statistics is $\frac{81.2-75}{s/\sqrt{50}}$. Do not reject H_0.