

## HW Answers for Ch 12.2 p. 772 & p. 776

Follow the templates and give complete answers. You know what should be added to these “shell answers”.

12.29 We want to test  $H_0 : p = 1/3$  versus  $H_a : p > 1/3$ . The test statistic is

$$z = \frac{304/803 - 1/3}{\sqrt{\frac{1/3 \times 2/3}{803}}} \doteq 2.72 \text{ with a } P\text{-value} = 0.0033. \text{ Yes, because } 0.0033 \text{ is less than } 0.01, \text{ this is}$$

strong evidence that more than one-third of this population never use condoms.

12.35 (a) We want to test  $H_0 : p = 0.5$  versus  $H_a : p > 0.5$ . The expected number of successes ( $np_0 = 50 \times 0.5 = 25$ ) and the expected number of failures (25) are both at least 10, so use of the  $z$  test for these subjects who must be viewed as an SRS of all coffee drinkers is appropriate. The

sample proportion is  $\hat{p} = \frac{31}{50} = 0.62$  and the test statistic is  $z = \frac{0.62 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{50}}} \doteq 1.70$ , with a  $P$ -value

$= 0.0446$ . Since  $0.0446 < 0.05$ , we reject  $H_0$  at the 5% level and conclude that a majority of people prefer the taste of fresh-brewed coffee. Some students may argue that the  $P$ -value is just barely below 0.05, so this result may not be practically significant. However, most students will point out that the results are significant and that this conclusion matches their personal experiences with coffee drinkers—a majority of people prefer fresh-brewed coffee. (b) A 90%

confidence interval for  $p$  is  $0.62 \pm 1.645 \sqrt{\frac{0.62 \times 0.38}{50}} = (0.5071, 0.7329)$ . We are 90% confident that between 51% and 73% of coffee drinkers prefer fresh-brewed coffee. (c) The coffee should be presented in random order. Some subjects should get the instant coffee first, and others should get the fresh-brewed coffee first.

12.36 Let  $\mu_M$  = the mean masculinity score of all hotel managers. We want to test

$H_0 : \mu_M = 4.88$  versus  $H_a : \mu_M > 4.88$ . The test statistic is  $t = \frac{5.91 - 4.88}{0.57/\sqrt{148}} \doteq 21.98$ , with  $df =$

147 and a  $P$ -value of 0 to many decimal places. Since the  $P$ -value is much smaller than 0.01, there is overwhelming evidence that hotel managers scored higher on the average than males in general. Turning to femininity scores, let  $\mu_F$  = the mean femininity score of all hotel managers.

We want to test  $H_0 : \mu_F = 5.19$  versus  $H_a : \mu_F > 5.19$ . The test statistic is  $t = \frac{5.29 - 5.19}{0.75/\sqrt{148}} \doteq 1.62$ ,

with  $df = 147$  and a  $P$ -value of 0.053. (To use Table C, look at the  $df = 100$  row and find that  $0.05 < P\text{-value} < 0.10$ .) There is some evidence that hotel managers exceed males in general,

but not convincing evidence (particularly because the sample size  $n = 148$  is quite large).