

**Solutions are included at the end of the worksheet. This worksheet is optional and will not be turned in, but may be helpful in reviewing material and studying for exams.**

- 1) A local juice manufacturer distributes juice in bottles labeled 32 ounces. A government agency thinks that the company is cheating its customers. The agency selects 50 of these bottles, measures their contents, and obtains a sample mean of 31.6 ounces with a standard deviation of 0.70 ounce. Use the classical approach and a 0.01 significance level to test the agency's claim that the company is cheating its customers.
  
- 2) In 2000, 36% of adults in a certain country were morbidly obese. A health practitioner suspects that the percent has changed since then. She obtains a random sample of 1042 adults and finds that 393 are morbidly obese. Is this sufficient evidence to support the practitioner's claim at the  $\alpha = 0.1$  level of significance?
  
- 3) According to a national statistics bureau, in 2000, 3.7% of males living in the Southwest were retired exterminators. A researcher believes that the percentage has increased since then. She randomly selects 250 males in the Southwest and finds that 4 of them are retired exterminators. Test this researcher's claim at the  $\alpha = 0.1$  level of significance.
  
- 4) A candidate for state representative of a certain state claims to be favored by at least half of the voters. If a hypothesis test is performed, how should you interpret a decision that fails to reject the null hypothesis?
  
- 5) An event is considered unusual if the probability of observing the event is  
A) less than 0.10                      B) greater than 0.95                      C) less than 0.025                      D) less than 0.05
  
- 6) A local retailer claims that the mean waiting time is less than 8 minutes. A random sample of 20 waiting times has a mean of 6.5 minutes with a standard deviation of 2.1 minutes. At  $\alpha = 0.01$ , test the retailer's claim. Assume the distribution is normally distributed.
  
- 7) A bank claims that the mean waiting time in line is less than 3.9 minutes. A random sample of 60 customers has a mean of 3.8 minutes with a standard deviation of 0.6 minute. If  $\alpha = 0.05$ , test the bank's claim using P-values.
  
- 8) The mean cost of textbooks for one class is greater than \$160. Identify the type I and type II errors for the hypothesis test of this claim.

## Answer Key

### Testname: MATH 1040 WORKSHEET 10

- 1) test statistic  $\approx -4.04$ ; critical value  $z_0 = -2.33$ ; reject  $H_0$ ; The data support the agency's claim.
- 2)  $H_0: p = 0.36$ ,  $H_1: p \neq 0.36$ ,  $Z = 1.15$ , P-value = 0.2585; do not reject  $H_0$ . There is not sufficient evidence at the  $\alpha = 0.1$  level of significance to support the practitioner's claim that the percentage of adults who are morbidly obese has change since 2000.
- 3)  $H_0: p = 0.037$  and  $H_1: p > 0.037$   
Since  $250(0.037)(1 - 0.037) = 8.91 < 10$ , we calculate the P-value:  
 $P(X \geq 4) = 1 - P(X < 4) = 1 - P(X \leq 3) = 1 - 0.016 = 0.984$ .  
Since  $0.984 > 0.1$ , we do not reject  $H_0$ .  
There is not significant evidence to conclude that the percentage has increased.
- 4) There is not sufficient evidence to reject the claim  $p \geq 0.5$ .
- 5) D
- 6) critical value  $t_0 = -2.539$ ; standardized test statistic  $\approx -3.194$ ; reject  $H_0$ ; There is sufficient evidence to support the retailer's claim.
- 7) P-value = 0.0985,  $P > \alpha$ , fail to reject  $H_0$ ; There is not sufficient evidence to support the claim that the mean waiting time is less than 3.5 minutes.
- 8) type I: rejecting  $H_0: \mu = \$160$  when  $\mu \leq \$160$   
type II: failing to reject  $H_0: \mu = \$160$  when  $\mu > \$160$