

**Chapter 14 Homework**

**Name:** \_\_\_\_\_

Scores on IQ tests are normally distributed with  $\mu = 100$  and  $\sigma = 15$ . I am interested in whether University of Scranton psychology majors have an average IQ that is greater than the general population; that is, whether University of Scranton psychology majors represent the population. I sample 25 psychology majors and find they have a sample mean IQ of 109.

1a. In this scenario, am I testing a *directional* or *non-directional* hypothesis? Why is this (be specific)?

1b. Expressed in terms of  $\mu$ , what are the *null* and *alternate* hypotheses?

$H_0$ :

$H_A$ :

1c. What is the *critical* z-Score ( $z_\alpha$ ) for rejecting  $H_0$  with  $\alpha = .05$ ?

1d. What is the *standard error of the mean* ( $\sigma_{\bar{X}}$ ) for this sample?

1e. What is the obtained z-Score for the sample mean of 109?

1f. Below, neatly draw a normal distribution centered on the appropriate population parameter from the information above. Shade in the critical region(s) and list the critical value. Correctly indicate where the sample would fall along the distribution.

1g. What should you conclude with respect the IQ of University of Scranton psychology majors compared to the general population? That is, assess the null and alternate hypotheses. (Use proper American/English!)

2. Given  $H_0: \mu = 10$ ,  $H_1: \mu \neq 10$ ,  $\bar{X} = 3.80$ ,  $\sigma = 2.770$ , and  $n = 81$ , calculate the observed z-Score.

3. Based on the outcome of problem #2, evaluate the null hypothesis with  $\alpha = .01$  (two-tails). That is, find  $z_\alpha$  and make a decision about the null and alternate hypothesis.

4. What effect does sample size have on the power of a statistical test (i.e, ability to reject the null hypothesis)? Why?