Question 1  [Section 8.1]. Do Problem 2 on page 324.

Question 2  [Section 8.2]. Consider the paint-drying situation of Example 8.2 on page 320 in which drying time is normally distributed with \( \sigma = 9 \) and \( \mu \) is unknown. The hypotheses are \( H_0 : \mu = 75 \) and \( H_a : \mu < 75 \). We wish to test these hypotheses using a sample of size \( n = 100 \).

(a) Suppose that we observe \( \bar{x} = 73.7 \). How many standard deviations (of \( \bar{X} \)) below the null value is \( x \)?

(b) Do we reject or fail to reject \( H_0 \) for \( \alpha = .05 \) if \( x = 73.7 \)?

(c) Unlike in part (b), suppose we reject \( H_0 \) when the \( z \)-value is less than \(-2.88\). What is the value of \( \alpha \) in this case?

(d) For the test in part (c), what is \( \beta(73) \)?

(e) Suppose we have not yet decided on the sample size but we wish to use the test in part (c). What is the smallest sample size for which the power of the test against the alternative \( \mu = 73 \) exceeds .95?

Question 3  [Section 8.2]. The recommended daily dietary allowance for zinc among males older than 50 is 15 mg/day. One study reports that for a random sample of 115 males aged 65–74, the mean daily zinc intake was 11.3 mg/day and the sample standard deviation was 6.43 mg/day. Using a t-test, do these data indicate that the true average daily zinc intake in the population of males 65–74 is less than the recommended daily allowance? Answer using both \( \alpha = .05 \) and \( \alpha = .01 \).

Question 4  [Section 8.3]. A manufacturing process is considered out-of-spec if it produces more than 3% defects. Due to the expense of shutting down and adjusting the machinery, only convincing evidence that the process is out-of-spec will result in a shutdown. Suppose that a test run of \( n = 1500 \) produces 55 defects.

(a) What are the appropriate null and alternative hypotheses?

(b) At the \( \alpha = .05 \) level, should the process be shut down?

(c) Suppose that 5% defects is considered truly unacceptable. The plant manager wishes to produce a test run large enough so that the test in part (b) will detect a problem 95% of the time if the true defect rate is 5%. In other words, she wants to have power at least 95% against the alternative \( p = .05 \). What is the minimum size of the test run with these characteristics?

Question 5  [Section 8.4]. Let \( \mu \) denote the mean tire pressure in trucks passing a check station on I-80. Suppose we wish to test the null hypothesis \( H_0 : \mu = 40 \) using a \( z \)-test. A random sample is collected and the observed \( z \) test statistic is .46. What would the \( p \)-value be for each of the following alternative hypotheses?

(a) \( \mu > 40 \)

(b) \( \mu \neq 40 \)

(c) \( \mu < 40 \)

Question 6  [Section 8.4].

(a) Give a \( p \)-value for the test in Question 2(a).

(b) Give a \( p \)-value for the test in Problem 3.

(c) Give a \( p \)-value for the test in Problem 4(a) in which 55 defects are produced from a sample of size 1500.