

**Homework 7; Monday, May 11**

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For questions 1 to 7 do the following:

- a. State the null and alternative hypotheses.
- b. Will you use a left-tailed, right-tailed, or two-tailed test?
- c. What is the level of significance?
- d. Identify the sampling distribution you will use: the standard normal or the Student's t?
- e. What is the value of the sample test statistic?
- f. Find the P-value. Sketch the sampling distribution and show the area corresponding to the P-value.
- g. Find the critical value.
- h. Based on your answers, will you reject or fail to reject the null hypothesis?

**1)** A large furniture has begun a new ad campaign on local television. Before the campaign, the long-term average daily sales were \$24,819. A random sample of 40 days during the new ad campaign gave a sample mean daily sale average of  $\bar{X} = \$25,910$ . Does this indicate that the population mean daily sales are now more than \$24,819? Use a 1% level of confidence, and assume that  $\sigma = \$1917$ .

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**2)** A new route has been established between downtown Denver and Englewood. Dan has taken the bus to work for many years. For the old bus route, he knows from long experience that the mean waiting time between buses at his stop was  $\mu = 20$  minutes. However, a random sample of five waiting times between buses using the new route had mean  $\bar{X} = 15.1$  minutes with sample standard deviation  $S = 6.2$  minutes. Does this indicate that the population mean waiting time for the new route is shorter than what it used to be? Use a level of confidence  $\alpha = 0.05$ . Assume that  $X$  is normally distributed.

**3)** The State Fish and Game Division claims that 75% of the fish in Homestead Creek are rainbow trout. However, the local fishing club caught 189 fish one weekend and found that 125 were rainbow trout. For this problem, assume that no single fish was caught more than once. Does this indicate that the percentage of rainbow trout in Homestead Creek is less than 75%? Use a level of confidence  $\alpha = 0.01$ .

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4) A music teacher knows from past records that 60% of students taking summer lessons play the piano. The instructor believes that this proportion may have dropped owing to the popularity of wind and brass instruments. A random sample of 80 students yielded 43 piano players. Test the instructor's claim at  $\alpha = 0.05$ .

5) A Chinese restaurant advertises that the average delivery time will be no more than 30 minutes. A random sample of delivery times (in minutes) is shown below.

32	28	21	39	30	27	29
39	32	28	42	25	26	30

Based on this sample, is the average delivery time greater than 30 minutes?. Use a 5% level of confidence, and assume that the distribution of times is normal.

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**6)** A telemarketer is trying two different sales pitches to sell a carpet cleaning service. For his aggressive sales pitch, 175 people were contacted by phone, and 62 of those people bought the cleaning service. For his passive sales pitch, 154 people were contacted by phone, and 45 of those people bought the cleaning service. Does this indicate that there is any difference in the population proportions of people who will buy the service depending on which sales pitch is used? Use  $\alpha = 0.05$ .

**7)** The average height of college hockey players has been 68.3 inches. A random sample of 14 hockey players gave a mean of 69.1 inches. We may assume that  $X$  has a normal distribution with  $\sigma = 0.9$  inch. Does this indicate that the population mean height is different from 68.3 inches? Use 5% level of significance.

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8) A small electronics store has begun to advertise in the local newspaper. Before advertising, the long-term average weekly sales were \$9,820. A random sample of 50 weeks while the newspaper ads were running gave a sample mean weekly sales of  $\bar{X} = \$10,960$ . Does this indicate that the population mean weekly sales is now more than \$9,820. Test at the 5% level of significance. Assume  $\sigma = \$1,580$ .

Select the null and alternative hypotheses.

a) $H_0: \mu = 9820$ ; $H_1: \mu < 9820$	b) $H_0: \mu = 9820$ ; $H_1: \mu > 9820$
c) $H_0: \bar{X} = 10960$ ; $H_1: \bar{X} < 9820$	d) $H_0: \mu = 10960$ ; $H_1: \mu > 10960$
e) $H_0: \mu > 9820$ ; $H_1: \mu = 9820$	

Select the appropriate z or t value of the sample test statistic:

a) $z = 5.10$	b) $z = 0.10$	c) $t = 0.72$	d) $z = -5.10$	e) $t = -0.10$
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Find the P-value or an interval containing the P-value for the sample test statistic.

a) P-value = 0.236	b) P-value = 0.460	c) P-value < 0.0001
d) P-value > 0.0001	e) Cannot determine	

Find the critical values

a) $z_0 = 2.33$	b) $z_0 = 1.96$	c) $t_0 = -1.96$	d) $z_0 = 1.645$	e) $t_0 = -1.96$
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Based on your answers, what is your conclusion?

a) Do not reject $H_0$	b) Reject $H_0$	c) Cannot determine
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9) The average annual salary of employees at Wintertime Sports was \$28,750. This year the company opened another store. Suppose that a random sample of 18 employees gave an average annual salary of  $\bar{X} = \$25,810$  with a sample standard deviation  $S = \$4,230$ . Use a 1% level of significance to test the claim that the average annual salary for all employees is different from last year's average salary. Assume the salaries are normally distributed.

Select the null and alternative hypotheses.

a) $H_0: \mu = 28,750$ ; $H_1: \mu < 28,750$	b) $H_0: \mu = 25,810$ ; $H_1: \mu \neq 25,810$
c) $H_0: \mu_1 = \mu_2$ ; $H_1: \mu_1 \neq \mu_2$	d) $H_0: \bar{X} = 25,810$ ; $H_1: \bar{X} \neq 25,810$
e) $H_0: \mu = 28,750$ ; $H_1: \mu \neq 28,750$	

Select the appropriate z or t value of the sample test statistic:

a) $t = -2.95$	b) $z = -2.95$	c) $t = -2.87$	d) $z = -12.51$	e) $t = 2.95$
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Find the P-value or an interval containing the P-value for the sample test statistic.

a) Cannot determine	b) $0.01 < \text{P-value} < 0.02$	c) $\text{P-value} < 0.010$
d) $\text{P-value} > 0.010$	e) $\text{P-value} < 0.005$	

Find the critical values

a) $t_0 = 2.58$	b) $t_0 = \pm 1.96$	c) $t_0 = \pm -2.567$	d) $t_0 = \pm 2.898$	e) $z_0 = -2.567$
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Based on your answers, what is your conclusion?

a) Do not reject $H_0$	b) Reject $H_0$	c) Cannot determine
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**10)** Results from previous studies showed that 79% of all high-school seniors from a certain city plan to attend college after graduation. A random sample of 200 high-school seniors from this city showed that 162 plan to attend college. Does this indicate that the percentage has increased from that of previous studies? Test a 5% level of significance.

Select the null and alternative hypotheses:

$H_0: \mu = 0.79$ ; $H_1: \mu > 0.79$	$H_0: p = 0.79$ ; $H_1: p \neq 0.79$	$H_0: p = 0.79$ ; $H_1: p > 0.79$
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Select the appropriate z or t value of the sample test statistic:

a) $z = 0.72$	b) $t = 1.645$	c) $z = 0.62$	d) $z = 1.645$	e) $z = 0.69$
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Find the P-value or an interval containing the P-value for the sample test statistic.

a) P-value = 0.2676	b) P-value = 0.7642	c) P-value < 0.05
d) P-value = 0.2451	e) P-value = 0.2358	

Find the critical values

a) $z_0 = 1.645$	b) $t_0 = 2.33$	c) $z_0 = 2.33$	d) $t_0 = \pm 2.58$	e) $z_0 = \pm 1.96$
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Based on your answers, what is your conclusion?

a) Do not reject $H_0$	b) Reject $H_0$	c) Cannot determine
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