

MTH 245.DL04 TEST 4

Name

Institutional Affiliations

Course

Date

MTH 245.DL04 TEST 4**1.**

Among smokers who try to quit with nicotine patch therapy, the majority (more than 50%) are smoking one year after the treatment. In a study of 8000 smokers, 4080 were smoking one year after using the nicotine patch therapy. Does the data provide sufficient evidence at the .01 level of significance to indicate that the nicotine patch therapy is not effective (that a majority of those using this treatment are smoking one year after the treatment)?

$$p = \frac{50}{100} = 0.5$$

$$n = 8000$$

$$\hat{p} = \frac{4080}{8000} = 0.51$$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

$$z = \frac{0.51 - 0.5}{\sqrt{\frac{0.5(1-0.5)}{8000}}} = 1.78885$$

$$p - value = 0.036819$$

p-value > significant figure therefore, do not reject the null hypothesis.

2.

A high school guidance counselor claims that it takes a mean of more than 5 years to earn a bachelor's degree. A random sample of 19 college graduates has a mean completion time of 5.23 years and a standard deviation of .87 years. Does the data support the counselor's claim at the .01 level of significance?

$$H_0: \mu_0 = 5; H_1: \mu_1 > 5$$

$$\sigma = 0.87 \text{ years}, \alpha = 0.01, \mu = 5 \text{ years}, n = 19, \bar{x} = 5.23 \text{ years}$$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{5.23 - 5}{\frac{0.87}{\sqrt{19}}} = 1.1524$$

From the z-tables

$$p = 0.87542$$

The result is not significant at $p > .01$ therefore we fail to reject the H_o

3.

A politician running for public office believes there should be tougher treatment for convicted criminals. For example, she believes that convicted embezzlers spend a mean of less than two

years in prison. A random sample of 160 convicted embezzlers has a mean prison stay of 1.81 years with a standard deviation of .84 years. Using the p-value to make your decision, does the data support the politician's belief at the .05 level of significance?

$$H_o: \mu_o = 2; H_1: \mu_1 > 2$$

$$\sigma = 0.84 \text{ years}, \alpha = 0.05, \mu = 2 \text{ years}, n = 160, \bar{x} = 1.81 \text{ years}$$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{1.81 - 2}{\frac{0.84}{\sqrt{160}}} = -2.8611$$

$$p - \text{value} = 0.00211$$

The result is significant at $\alpha = 0.05$ therefore we reject H_o

4.

The sample size, mean life expectancy, and standard deviation, for males in the general population and male postal workers are summarized in the given table. At the .10 level of significance, does the data suggest that male postal workers have a mean life span that is

different from the mean life span of males in the general population? (Let μ_1 = mean life span for males in the general population and μ_2 = mean life span for male postal workers)

Males in the general population	Male postal workers
$n_1 = 120$	$n_2 = 150$
$\bar{x}_1 = 85$	$\bar{x}_2 = 83$
$s_1 = 7.4$	$s_2 = 6.9$

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

$$t - \text{statistic} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$$t - \text{statistic} = \frac{(85 - 83) - 0}{\sqrt{\frac{7.4^2}{120} + \frac{6.9^2}{150}}} = 2.2737$$

Degree of freedom (D.f)

$$D.f = n_1 + n_2 - 2$$

$$D.f = 120 + 150 - 2 = 268$$

$$p - \text{value} = t.\text{dist}(t - \text{statistic}, D.f)$$

$$p - \text{value} = t.\text{dist}(2.2737, 268) = 0.0238$$

$p - \text{value} < \text{significant value}$ therefore, reject the null hypothesis