Quiz 7

Name: _____

Red ID: _____

Use the following to answer questions 1 through 3

In 2010, 92% of Iowa high school seniors graduated with a high school degree. I would like to know if the Iowan high school senior graduation rate has since decreased. In a sample of the records of 400 Iowan high school seniors, 364 successfully graduated.

$H_0: p = 0.92$ $H_a: p < 0.92$

1. Under the appropriate hypothesis test, what would constitute a type I error?

a) The true graduation rate is 0.91, but I claim it is lower
b) The true graduation rate is 0.92, but I claim it is higher
c) The true graduation rate is 0.92, but I claim it is 0.91
d) The true graduation rate is less than 0.92, but I do not claim this
e) The true graduation rate is 0.92, but I claim it is lower

H_0 true, RTN

$\hat{p} = \frac{364}{400} = 0.91$

2. Under the appropriate hypothesis test, what would constitute a type II error?

a) The true graduation rate is 0.92, but I claim it is lower
b) The true graduation rate is less than 0.92, but I do not claim this
c) The true graduation rate is less than 0.91, but I do not claim this
d) The true graduation rate is less than 0.92, but I claim it is greater than this
e) The true graduation rate is less than 0.92, and I claim that it is less than 0.92

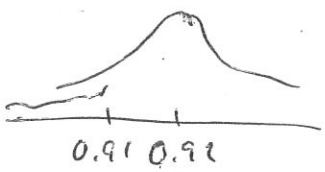
H_0 false, FTRJN

3. What is the p-value under the appropriate hypothesis test?

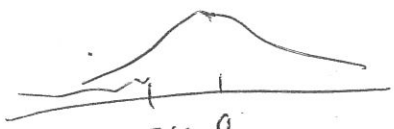
$\hat{p} \sim AN(p, \sqrt{\frac{pq}{n}})$ $\hat{p} \sim AN(0.92, \sqrt{\frac{(0.92)(0.08)}{400}})$

$\hat{p} \sim AN(0.92, 0.0136)$

a) 0.23
b) 0.09
c) 0.19
d) 0.03
e) 0.77



$Z = \frac{0.91 - 0.92}{0.0136} = -0.74$



0.2296

4. It is known that average white blood cell count is normally distributed with a mean of 6890 cells/mcL and a standard deviation of 1825. We are interested in whether regular immersion in cold water has any effect on white blood cell count. 11 subjects are instructed to shower daily in cold water for 15 minutes. After a month their blood is drawn and white blood cell count measured. Average white blood cell count was found to be 7853. Under the appropriate hypothesis test, what would be the p-value?

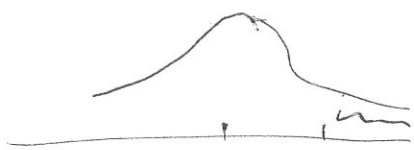
$H_0: \mu = 6890$ $H_a: \mu \neq 6890$ $\sigma = 1825$ $\bar{x} = 7853$

$\bar{x} \sim N(\mu, \sigma/\sqrt{n})$

$\bar{x} \sim N(6890, \frac{1825}{\sqrt{11}})$

$\bar{x} \sim N(6890, 550.26)$

a) 0.04
b) 0.30
c) 0.02
d) 0.08
e) 0.96



$Z = \frac{7853 - 6890}{550.26} = 1.75$

$+0.9599$

$= 0.0401$

p-value $= 2(0.0401)$

$= 0.0802$

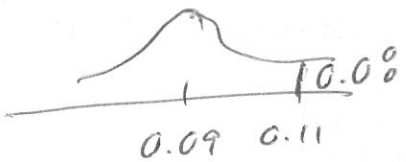
Use the following for questions 5 through 7

Several years ago the unemployment rate was 9%. I would like to see whether it has since increased. In a sample of adults taken recently, I ask those in my sample whether they're unemployed, and calculate a sample proportion of 0.11. In the appropriate hypotheses test using $\alpha = 0.10$, I calculate a p-value of 0.08.

$\hat{p} = 0.11$

5. What would be the appropriate null and alternative hypotheses?

a) $H_o: p=0.09 \quad H_a: p \neq 0.09$
b) $H_o: p=0.09 \quad H_a: p=0.11$
c) $H_o: \hat{p}=0.09 \quad H_a: \hat{p} \neq 0.09$
d) $H_o: p=0.09 \quad H_a: p>0.09$
e) $H_o: \hat{p}=0.09 \quad H_a: \hat{p}=0.11$



6. Which is the correct conclusion?

p-value $\leq \alpha$
RTN

a) I will reject the null hypotheses and conclude more than 9% of adults are unemployed
b) I will reject the null hypotheses and conclude 11% or more of adults are unemployed
c) I will fail to reject the null hypotheses and find there is not enough evidence to conclude more than 9% of adults are unemployed
d) I will fail to reject the null hypotheses and conclude more than 9% of adults are unemployed
e) I will reject the null hypotheses and conclude fewer than 8% of adults are unemployed

7. What is the correct interpretation of the p-value?

a) If the true rate of unemployment is 0.11, the probability I would get a sample proportion of 0.09 or lower is 0.08.
b) If the true rate of unemployment is 0.09, the probability I would get a sample proportion of 0.11 or higher is 0.08.
c) If the true rate of unemployment is 0.09, the probability I would get a sample proportion of 0.09 or higher is 0.08.
d) If the true rate of unemployment is 0.11, the probability I would get a sample proportion of 0.09 or higher is 0.08.
e) If the true rate of unemployment is 0.09, the probability I would get a sample proportion of 0.11 or lower is 0.08.

8. I am interested in whether a new drug causes a decrease in cholesterol levels. After conducting a hypotheses test, I conclude there is not enough evidence to indicate that this drug does cause a decrease in cholesterol levels. If my conclusion was incorrect, what type of hypotheses testing error have I made?

FTRN

a) Type I
b) Type II

Type II: H_0 false, FTRN