Name:_____ **Due 12/17/2018**

Math 173 Introduction to Probability and Statistics **Quiz 5**

1. (10 points) Suppose you wish to estimate a population mean μ based on a random sample of n observations, and prior experience suggests that the standard deviation $\sigma = 14$. If you wish to estimate μ correct to within 1.5, with probability equal to .99, at least how many observations should be included in your sample?

2. (10 points) Suppose you wish to estimate the percent (proportion) of voters that support a proposed bill correct to within 1 percentage point (.01) with 95% confidence. At least how many randomly selected voters should you poll? (Note that you do not have any information about what the proportion may be.)

3. A politician claims that the average monthly rent in her city increased by only $\mu = 25$ dollars over her two year term. However, you suspect this is false and decide to conduct a statistical test to show that the average monthly rent actually increased more than this at the significance level of $\alpha = .05$. Suppose you contact $n = 50$ randomly selected renters and find that the average monthly rent increased by $\bar{x} = 30$ dollars with a standard deviation of $s = 15$ dollars.

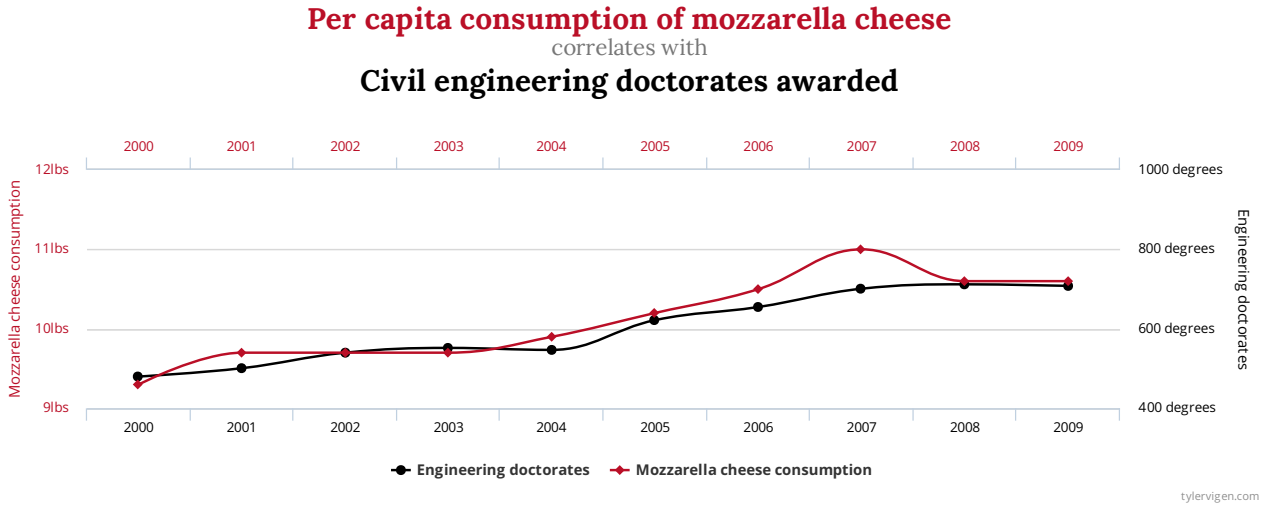
   (a) (5 points) State the null and alternative hypotheses, H_0 and H_a.

   (b) (10 points) Describe the rejection region for either $\bar{x}$ or the standardized measurement z.

   (c) (5 points) Conclude whether you have sufficient evidence to reject the null hypothesis.

   (d) (10 points) What is the smallest value α for which you could reject the null hypothesis (i.e. what is the p-value for this test)?

4. Curiously, data collected between the years 2000 and 2009 shows that per capita annual consumption of mozzarella cheese has increased in proportion to the annual number of civil engineering doctorates awarded. The data is summarized in the chart and table below.



x, civil engineering doctorates awarded	y, per capita consumption of mozzarella cheese (lbs)
480	9.3
501	9.7
540	9.7
552	9.7
547	9.9
622	10.2
655	10.5
701	11.0
712	10.6
708	10.6

Using the data in the table above, the following statistics are obtained.

$$\bar{x} = 601.8 \quad s_x = 88.6940$$

$$\bar{y} = 10.12 \quad s_y = .5412$$

$$r = .9586$$

(a) (5 points) What does it mean that the correlation coefficient r is close to 1?

(b) (10 points) Find an equation for the regression line $y = a + bx$.

(c) (5 points) Use your answer to part (b) to predict the per capita consumption of cheese for a year in which 1000 civil engineering doctorates are awarded.