A.P. Statistics
Assignment 7.4

Remember to show your thinking through your work.

1)   Describe in your own words how you write the hypotheses for a significance test.

2)   What is the test statistic and how do you find it?

3)   What is a p-value?

4)   Generally speaking, what is the conclusion if p is less than 5%?

5)   Generally speaking, what is the conclusion if p is greater than 5%?

6)   Each of the following situations requires a significance test about a population mean μ. State the appropriate null hypothesis H_0 and alternative hypothesis H_a in each case.

   (a)   The mean area of the several thousand apartments in a new development is advertised to be 1250 square feet. A tenant group thinks that the apartments are smaller than advertised. They hire an engineer to measure a sample of apartments to test their suspicion.

   (b)   Larry's car averages 32 miles per gallon on the highway. He switches to a new motor oil that is advertised as increasing gas mileage. After driving 3000 highway miles with the new oil, he wants to determine if his gas mileage actually has increased.

   (c)   The diameter of a spindle in a small motor is supposed to be 5 millimeters. If the spindle is either too small or too large, the motor will not perform

properly. The manufacturer measures the diameter in a sample of motors to determine whether the mean diameter has moved away from the target.

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7) You have performed a one-sided test of significance and obtained a value of $z = 0.215$. Find the approximate P-value for this test.

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8) A test of the null hypothesis H_0: $\mu = 0$ gives test statistic $z = 1.8$.
(a) What is the P-value if the alternative is Ha: $\mu > \mu_0$?

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(b) What is the P-value if the alternative is Ha: $\mu < \mu_0$?

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(c) What is the P-value if the alternative is Ha: $\mu \neq \mu_0$?

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9) The mean yield of corn in the United States is about 120 bushels per acre. A survey of 40 farmers this year gives a sample mean yield of $x = 123.8$ bushels per acre. We want to know whether this is good evidence that the national mean this year is not 120 bushels per acre. Assume that the farmers surveyed are an SRS from the population of all commercial corn growers and that the standard deviation of the yield in this population is $\sigma = 10$ bushels per acre. Give the P-value for the test of:
H_0: $\mu = 120$
H_a: $\mu \neq 120$
Are you convinced that the population mean is not 120 bushels per acre?

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10) More than 200,000 people worldwide take the GMAT examination each year as they apply for MBA programs. Their scores vary normally with mean about $\mu = 525$ and standard deviation about $\sigma = 100$. One hundred students go through a rigorous training program designed to raise their GMAT scores. Test the hypotheses
H_0 : $\mu = 525$
H_a : $\mu > 525$
in each of the following situations:
(a) The students' average score is $x = 541.4$. Is this result significant at the 5% level?

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(b) The average score is x = 541.5. Is this result significant at the 5% level?

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(c) What conclusions may you draw by comparing the answers to parts a and b?

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