

**A.P. Statistics**  
**Assignment 9.2**

**Remember to show your thinking through your work.**

- 1) What are the conditions for using the standard deviation formula when conducting a significance test? Be specific about  $p$  versus  $\hat{p}$ .

- 2) What are the conditions for approximating with a normal distribution?

- 3) In each of the following cases state whether or not the normal approximation to the binomial should be used for a significance test on the population proportion  $p$ .

- (a)  $n = 10$  and  $H_0: p = 0.4$ .

- (b)  $n = 100$  and  $H_0: p = 0.6$ .

- (c)  $n = 1000$  and  $H_0: p = 0.996$ .

- (d)  $n = 500$  and  $H_0: p = 0.3$ .

- 4) Leroy, a starting player for a major college basketball team, made only 38.4% of his free throws last season. During the summer he worked on developing a softer shot in the hope of improving his free-throw accuracy. In the first eight games of this season Leroy made 25 free throws in 40 attempts. Let  $p$  be his probability of making each free throw he shoots this season.

- (a) State the null hypothesis  $H_0$  that Leroy's free-throw probability has remained the same as last year and the alternative  $H_a$  that his work in the summer resulted in a higher probability of success.

- (b) Calculate the  $z$  statistic for testing  $H_0$  versus  $H_a$ .

- (c) Do you accept or reject  $H_0$  for  $\alpha = 0.05$ ? Find the  $P$ -value.

- (d) Give a 90% confidence interval for Leroy's free-throw success probability for the new season. Are you convinced that he is now a better free-throw shooter than last season?

- (e) What assumptions are needed for the validity of the test and confidence interval calculations that you performed?

- 5) A software company is planning for an upgrade of their software. You must charge customers \$100. Are your customers willing to pay this much? You contact a random sample of 40 customers and find that 11 would pay \$100 for the upgrade. If the upgrade is to be profitable, you will need to sell it to more than 20% of your customers. Do the sample data give good evidence that more than 20% are willing to buy?

- (a) Formulate this problem as a hypothesis test. Give the null and alternative hypotheses.

- (b) Carry out the significance test. Report the test statistic and the P-value.

- (c) Should you proceed with plans to produce and market the upgrade?