Practice Problems For Hypothesis

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1. A medical company has developed a new type of vaccine for pneumonia. They are interested in seeing if the proportion of people given their vaccine and got pneumonia is lower than the proportion of people who had the old vaccine and got pneumonia. The old pneumonia vaccine still had a contraction rate of .07. What is the correct Null Hypothesis and Alternative Hypothesis?

H_0

A. $p \neq \hat{p}$
B. $p = .07$
C. $p < .07$
D. $p \geq .07$

H_A

A. $p \neq \hat{p}$
B. $p = .07$
C. $p < .07$
D. $p = \hat{p}$
E. $p \neq .07$

2. A large company recently hired an advertising agency. The CEO of the company is interested in if more people recognize the company name now that the advertising is being ran from an outside company. The old proportion of people who recognized the company was .47. What is the correct Null Hypothesis and Alternative Hypothesis?

H_0

A. $p \leq .47$
B. $\hat{p} = .47$
C. $p = .47$
D. $\hat{p} = p$

H_A

A. $\hat{p} > .47$
B. $p > .47$

C. $p \neq .47$
D. $p \geq .47$

3. Cyride (bus system in Ames IA) tries to be on time as much as possible. In particular management wanted to know if the busses were delayed because too many bus stops had people running to catch the bus. To this end the driver's were instructed to keep a tally for how many bus stops they had to wait for "runners". The old scheduling method assumed the busses would wait at a rate of 1 in 5 bus stops. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p <= 1/5
H_A: p > 1/5

4. A teacher in a middle school is interested to see if a new method of teaching reading would improve the literacy rate of their students. So for one year they taught with the new method and then looked at the standardized test scores for their students. From past standardized testing, the teacher knew that around 82% of their students would pass. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p <= .82
H_A: p > .82

5. A light bulb company is trying out a new type of halogen light bulbs which they can produce much cheaper than the old light bulbs. They want their new light bulbs will last roughly the same length of time as the old light bulbs. If the new light bulbs don't last as long people will not buy them. If the light bulbs last too long then people will not buy enough of them for the company to make a profit. So the company runs an experiment with 50 of the new light bulbs running. At the end of 5 months the proportion of light bulbs **still remaining lit** were recorded for the new group. It was known through a prior experiment that the old light bulbs would have 92% still operational. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p <= 1/5
H_A: p > 1/5

6. There is a professor at the University of Maine[1] who is infamous for having his classes run over time. In a given semester an average professor would run over time with a proportion of about .10. Students

[1] Go Black Bears!!!

in his class, after being taught hypothesis testing for proportions, recorded the proportion of days he ran over time and then preformed a hypothesis test. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p <= .1
H_A: p > .1

NOTE: It's unclear if this is "not equal to" or "greater than" but given the context (ie the prof let's them out late) we probably want greater than

7. I happen to drink a lot of tea. About 9 cups in a day actually and usually some coffee to top it off[2]. I get a lot of my tea down in the East Village of Des Moines at Gung Fu Tea. Because of the amount of tea I buy from them I was once concerned they were underfilling the packages of tea. So over the course of a year I recorded the amount of tea in each package I bought on my own scales at home. After the year was over I found the proportion of tea that had been underfilled. I was only going to be concerned if more than 10% of bags were underfilled. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p <= .1
H_A: p > .1

8. A business owner is interested to see if the a new manufacturer of sweatshirts is producing the sweatshirts at a better quality than the old manufacturer. To this end, the owner has a load of sweatshirts inspected to find the proportion that are defective. The old manufacturer had a defective proportion of about .04. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p >= .04
H_A: p < .04

9. A researcher at a large East Coast university is interested to see if the "science" programs have the same proportion of females as the "engineering" programs. The current enrollment for females in the engineering department is 4000 students out of 10,000. Please state the Null Hypothesis and Alternative Hypothesis.

H_0: p = .4
H_A: p != .4

NOTE: the symbol != means "not equal to"

[2]Grad students survive on caffeine