A.P. Statistics
Assignment 5-7

<u>Remember to show your thinking through your work.</u>

1) A poll of 500 randomly selected registered voters was recently administered. Respondents were asked, "Do you approve of President Bush's policies relating to the war in Iraq?" Suppose that we know that 40% of all registered voters approve of the policies.

    a) What is the random variable X?

    b) Is X binomial? Support your answer.

    c) What is the probability that at most 185 voters responded yes to the question?

    d) How many voters would you expect to respond yes?

2) Some people believe in the force (yes, like in Star Wars). To test if young Anakin Skywalker has the force with him, he is told that some cards that Yoda can see but Anakin cannot contain a picture of a planet, a lightsaber, a laser rifle, or a spaceship. As Yoda looks at 20 such cards in turn, Anakin tries to guess what is on the card Yoda is looking at. Of course, Anakin has a 25% chance of simply guessing correctly.

    a) Verify that the count of correct guesses in 20 cards follows a binomial distribution and write the notation.

    b) What is the mean number of correct guesses?

    c) What is the probability that Anakin guesses all 20 cards correctly?

d) Suppose Anakin guesses correctly on 10 of the cards. What is the probability of him doing this well or better by chance? Do you think he has the force with him?

3) Lie detectors have a 15% chance of concluding that a person is lying even when they are telling the truth. A bank conducts interviews of job applicants with the use of the lie detector. There are 15 applicants who are interviewed.

a) Assuming all 15 applicants tell the truth, what is the probability that the lie detector will conclude that all 15 are telling the truth?

b) Assuming all 15 applicants tell the truth, what is the probability that the lie detector will conclude that at least one is lying?

c) What are the mean and standard deviation of the 15 truthful applicants?

d) What is the probability that the number of truthful applicants classified as liars is greater than the mean?

4) DHL Shipping claims that it ships 95% of its orders within three working days. You select a simple random sample of 100 orders and discover that only 91 of them shipped on time.

a) If DHL really does ship 95% on time, what is the probability that the company shipped 91 or fewer out of 100 orders were shipped on time?

b) A marketer from UPS jumps on the research stating, “They claim 95% on time, but by their own research they only ship 91% on time!” Provide a rebuttal to the UPS marketer in non-statistical terms.

5) A new medical test provides a false positive result for Hepatitis 2% of the time. That is, a perfectly healthy subject being tested for Hepatitis will test as being infected 2% of the time. In research, the test is given to 30 healthy (not having Hepatitis) subjects. Let X be the number of subjects who test positive for the disease.

a) What is the probability that all 30 subjects will appropriately test as not being infected?

b) What are the mean and standard deviation of X?

c) To what extent do you think this is a viable test to use in the field of medicine?