AP STATISTICS
Binomial and Geometric Probability Worksheet (HW 5.3)

Please show all work and solutions on separate paper. Round probabilities to 4 decimal places when appropriate.

1. A basketball player has made 70% of his free throws during the season. Assuming the shots are independent, find the probability that in tonight's game, he

   a) misses for the first time on his fourth attempt.

   b) makes his first basket on his fifth shot.

   c) makes his first basket on one of his first 4 shots.

   d) What is the expected number of shots until he misses?

2. Suppose a smartphone chip manufacturer rejects 20% of the chips produced because the fail presale testing.

   a) What is the probability that the fifth chip you test is the first bad one you find?

   b) What's the probability you find a bad one within the first 8 you examine?

   c) How many do you expect to test before finding a bad one?

3. Assume that 17% of people are left-handed. If we select 6 people at random, find the probability of

   a) The first lefty is the fifth person chosen.

   b) There are some lefties among the 6 people.

   c) The first lefty is the second or third person.

   d) There are exactly 2 lefties in the group.

   e) There are at least 2 lefties in the group.

   f) There are no more than 2 lefties in the group.

   g) How many lefties do you expect?

   h) What is the standard deviation?

   i) If we keep picking people until we find a lefty, how long do you expect it will take?

Suppose we chose 18 people instead of 6.

j) Find the mean and standard deviation of the number of right-handers in the group.

k) What's the probability that they're not all right handed?

l) What's the probability that there are no more than 16 righties?

m) What's the probability that there are exactly 9 of each?

n) What's the probability that there is a majority of right-handers?

o) A lecture hall has 240 seats with folding arm tablets, 40 of which are designed for left-handers. The average size of classes that meet there is 225, and we can assume that about 17% of students are left-handed. What's the probability that a right-handed student in one of these classes will have to use a left-handed arm tablet?

p) For a binomial model where np and nq are both at least $10_{(ish)}$, we are allowed to use a Normal model approximation, with $\mu_X = np$ and $\sigma_X = \sqrt{np(1-p)}$ *(hey, these are on the formula chart!)*.
   Using this information, recalculate the answer to the previous problem by using a Normal model approximation.

   How does this answer compare to the one calculated in part (o)?

SELECTED SOLUTIONS: (YOU MUST SHOW WORK FOR EACH FOR CREDIT)

1) a) 0.1029   b) 0.00567   d) 3.3333... *(expected values and standard deviations must NOT be rounded to an integer!)*

3) b) 0.6731   c) 0.2582 f) 0.9345 i) 5.88 people   k) 0.9650 m) 0.0011 o) 0.0052