

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 5 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) 0.6061 c) 0.2582 f) 0.9345 i) 5.88 people k) 0.9650 m) 0.0011 o) 0.0052