

Binomial Distribution Worksheet

P1. For a binomial variable X , with $n = 5$ and $p = 0.40$.

1. Complete the table for each value of X .

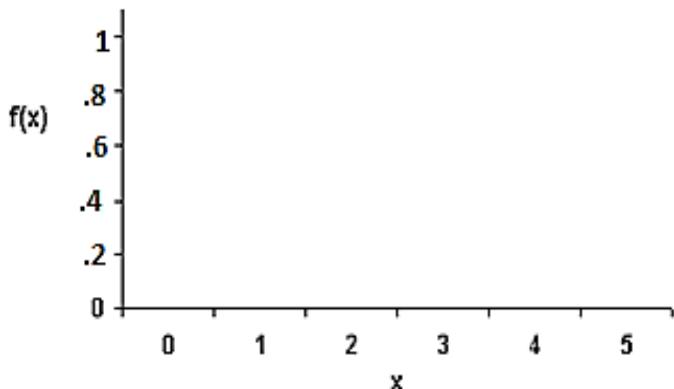
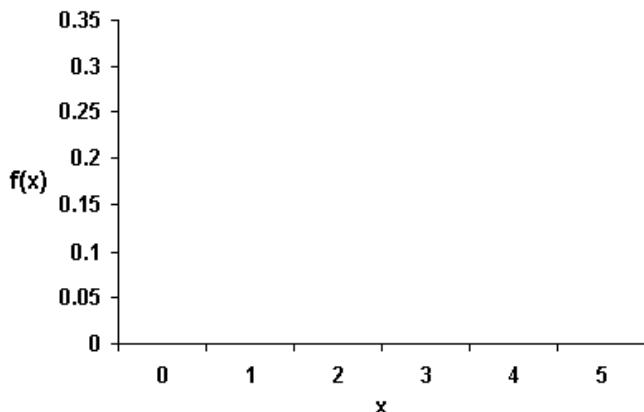
- a) Probability Distribution:

x	
$f(x)$	

- b) Cumulative Distribution

x	
$f(x)$	

2. Draw a histogram for each.



3. Compute the mean and standard deviation of X .

P2. For a binomial variable X , with $n = 14$ and $p = 0.80$, find

1. $P(X \leq 8)$
2. $P(X = 8)$
3. $P(X \geq 12)$
4. The mean and standard deviation of X .
5. $P(9 \leq X \leq 13)$
6. $P(X < 2)$
7. $P(X > 12)$
8. $P(4 \leq X < 7)$

P3. For the binomial distribution with $n = 10$ and $p = 0.3$, find the probability of

1. Five or more successes.
2. At most two successes.
3. At least one success.
4. More than 50% successes.

P4. Find the probability of

1. 12 successes in 20 trials when the probability of a success is 0.7.
2. 8 failures in 20 trials when the probability of a failure is 0.3.
3. Explain why you get identical answers in parts (a) and (b).

P5. The population of a large city is 60% African-American. A jury of 12 is selected at random from the citizens of the city.

1. What is the probability that at most 3 African-Americans are selected?
2. What is the probability that at most 2 African-Americans are selected?
3. What is the expected number of African-Americans on the jury? What is the standard deviation?

P6. Suppose, for the purpose of argument, that 20% of the otters in a large aquatic community are typically infected with a parasite. A biologist samples 16 otters at random and records, for each, whether or not the animal is infected.

1. Find the mean number of infected otters in the sample.
2. What is the probability exactly 20% of the sampled otters are infected?
3. What is the probability more than 50% of the sampled otters are infected?
4. Suppose more than 50% of the sampled otters are infected. How might the biologist respond to such information? Use the probability of part (d) to support your argument.

P7. When an assembly machine is properly calibrated approximately 5% of the finished products are defective. Periodically the quality control engineer randomly selects 20 products at random, and tests them. He will halt the production line to check (and reconfigure, if necessary) the calibration if any of the tested products are defective. Assuming that the machine is properly calibrated, what is the probability that production must be halted?

P8. If 10% of men are bald, what is the probability that fewer than 100 in a random sample of 818 men are bald?

1. Answer this using binomial calculations
2. Answer this using a Normal approximation. Make sure to check your “rule of thumb” first!
3. Compare your answers to #1 and #2. If the Normal approximation a good estimation?