

Binomial Distribution Additional Exercises

1. According to Financial Executive (July/August 1993) disability causes 48% of all mortgage foreclosures. Given that 20 mortgage foreclosures are audited by a large lending institution, what is the probability that less than 8 eight foreclosures are due to a disability?
2. Ninety percent of the trees planted by a landscaping firm survive. What is the probability that of the next 13 trees planted: a. at most ten will survive? b. at least ten will survive? c. exactly ten will survive?
3. A machine produces parts of which 0.5% are defective. If a random sample of ten parts produced by this machine contains more than one defective part, the machine is shut down for repairs. Find the probability that the machine will be shut down for repairs based on this sampling plan.
4. According to an article in the February 1991 issue of Reader's Digest, Americans face a 1 in 20 chance of acquiring an infection while hospitalized. If the records of 15 randomly selected hospitalized patients are examined, find the probability that: a. at least two develop an infection? b. none develop an infection?
5. According to the USA Snapshot® "Knowing drug addicts," 45% of Americans know somebody who became addicted to a drug other than alcohol. Assuming this to be true, what is the probability that out of a group of 30 randomly selected Americans: a. exactly 15 know somebody who became addicted to a drug? b. at most 15 know somebody who became addicted to a drug? c. more than 15 know somebody who became addicted to a drug? d. between 10 and 15 know somebody who became addicted to a drug?
6. Suppose that you take a five-question multiple-choice quiz by guessing. Each question has possible answers a, b, c, d and only one is correct. (a) What is the probability that you guess more than half of the answer correctly? (b) What is the probability that the first question is correct if quessing?

Answers on TI-83

1. $P(x \leq 7) = \text{binomcdf}(20, .48, 7) \approx 0.17392 \approx 0.174$
2. (a) $P(x \leq 10) = \text{binomcdf}(13, .9, 10) \approx 0.13388 \approx 0.134$
 (b) $P(x \geq 10) = 1 - \text{binomcdf}(13, .9, 9) \approx 0.96584 \approx 0.966$
 (c) $P(x = 10) = \text{binompdf}(10, .9, 10) \approx 0.09972 \approx 0.100$
3. $P(x > 1) = P(x \geq 2) = 1 - \text{binomcdf}(10, .005, 1) \approx 0.001095 \approx 0.001$
4. (a) $P(x \geq 2) = 1 - \text{binomcdf}(15, .05, 1) \approx 0.17095 \approx 0.171$
 (b) $P(x = 0) = \text{binompdf}(15, .05, 0) \approx 0.46329 \approx 0.463$
5. (a) $P(x = 15) = \text{binompdf}(30, .45, 15) \approx 0.12425 \approx 0.124$
 (b) $P(x \leq 15) = \text{binomcdf}(30, .45, 15) \approx 0.76909 \approx 0.769$
 (c) $P(x \geq 16) = 1 - \text{binomcdf}(30, .45, 15) \approx 0.23091 \approx 0.231$
 (d) $P(10 \leq x \leq 15) = \text{binomcdf}(30, .45, 15) - \text{binomcdf}(30, .45, 9) \approx 0.69968 \approx 0.700$
6. (a) $P(x \geq 3) = 1 - \text{binomcdf}(5, .25, 2) \approx 0.10352 \approx 0.104$
 (b) $P(\text{Answer 1st Question by guessing}) = 1/4 = 0.25$