

Practice 12-6

Binomial Distributions

1. The probability that a baby is a male is 50%. Use a tree diagram to find each probability.
- $P(\text{at least 1 baby in a family with 3 children is a male})$
 - $P(\text{at least 2 babies in a family of 3 children are male})$
 - $P(\text{exactly 2 of 3 babies born in the hospital on any day are male})$

For each situation, describe a trial and a success. Then design and run a simulation to find the probability.

- The probability that the weather will be acceptable for a launch of the space shuttle over the next 3 days is 70% each day. Find the probability that the weather will be acceptable at least one of the next three days.
- A poll shows that 30% of the voters favor an earlier curfew. Find the probability that all of five people chosen at random favor an earlier curfew.
- The probability that a machine part is defective is 10%. Find the probability that exactly one part is defective in a sample of five parts.

Find the probability of x successes in n trials for the given probability of success p on each trial.

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| 5. $x = 5, n = 5, p = 0.4$ | 6. $x = 2, n = 8, p = 0.9$ |
| 7. $x = 3, n = 10, p = 0.25$ | 8. $x = 1, n = 3, p = 0.2$ |

Use the binomial expansion of $(p + q)^n$ to calculate and graph each binomial distribution.

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| 9. $n = 5, p = 0.6$ | 10. $n = 3, p = 0.7$ |
| 11. $n = 3, p = 0.1$ | 12. $n = 4, p = 0.8$ |
13. There is a 60% probability of rain each of the next 5 days. Find each probability. Round to the nearest percent.
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|---|---|
| a. $P(\text{rain at least 3 of the next 5 days})$ | b. $P(\text{rain at least 1 of the next 5 days})$ |
| c. $P(\text{rain at least 1 of the next 4 days})$ | d. $P(\text{rain at least 1 of the next 2 days})$ |
14. In one area the probability of a power outage during a rainstorm is 4%. Find each probability. Round to the nearest percent.
- $P(\text{at least 1 outage in the next 5 rainstorms})$
 - $P(\text{at least 2 outages in the next 10 rainstorms})$
 - $P(\text{at least 1 outage in the next 20 rainstorms})$

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