

AP Statistics

A study of social mobility in England looked at the social class reached by sons of lower-class fathers. Social classes are numbered from 1 (low) to 5 (high). Take the random variable X to be the class of a randomly chosen son of a father in Class 1. The study found that the distribution of X is

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| Son's Class: | 1 | 2 | 3 | 4 | 5 |
| Probability: | 0.48 | 0.38 | 0.08 | 0.05 | 0.01 |

1. What percent of the sons of lower-class fathers reach the highest level, Class 5?
2. What is $P(X \leq 3)$?
3. What is $P(X < 3)$?
4. Write the event "a son of a lower-class father reaches one of the two highest classes" in terms of values of X . What is the probability of this event?

The level of cholesterol in the blood is important because high cholesterol levels may increase the risk of heart disease. The distribution of blood cholesterol levels in a large population of people of the same age and sex are roughly normal. For 14-year old boys, the mean is $\mu = 170$ milligrams of cholesterol per deciliter of blood (mg/dl) and the standard deviation is $\sigma = 30$ mg/dl. Levels above 240 mg/dl may require medical attention.

5. What is the probability of 14-year-old boys have more than 300 mg/dl of cholesterol?
6. What is the probability of 14-year-old boys have less than 200 mg/dl of cholesterol?
7. What is the probability of 14-year-old boys with cholesterol between 140 mg/dl and 200 mg/dl of cholesterol?

The probabilities that a customer selects 1, 2, 3, 4, or 5 items at a convenience store are 0.32, 0.12, 0.23, 0.18, and 0.15, respectively.

1. Construct a probability distribution (table) for the data, and verify that this is a legitimate probability distribution.
2. Construct a probability histogram.
3. Find the mean of the random variable, X .
4. Find the standard deviation of X .
5. Here's a game: If a player rolls two dice and gets a sum of 2 or 12, he wins \$20. If the person gets a 7, he wins \$5. The cost to play the game is \$3. Find the expected payout for the game.
6. A lottery offers one \$1,000 prize, one \$500 prize, and five \$100 prizes. One thousand tickets are sold at \$3 each. Find the expected value if a person buys one ticket.
7. In roulette, there are 38 numbers, 00, 0, and 1-36. If you bet \$1 on a number and win, you receive an additional \$35. How much do you expect to win or lose on each play if you bet on a number?