

$$\frac{a}{b} = \frac{1-P(E)}{P(E)} \quad P(E) = \frac{b}{a+b} \quad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(B|A) = \frac{n(A \text{ and } B)}{n(A)} = \frac{P(A \text{ and } B)}{P(A)}$$

$$P(A \text{ and } B) = P(A) \cdot P(B|A) \quad P(A \text{ and } B) = P(A) \cdot P(B) \text{ if } A \text{ and } B \text{ are independent}$$

1. (2pts) If 87% of households in a town earn more than \$20,000 in a year, what is the probability that a random selected household earns less than \$20,000 in a year?

2. (2pts) During the first two years of college, you took 80 exams, and on 11 of them there was a question that completely surprised you. What is the empirical probability of receiving a question on an exam that completely surprises you?

3. (7pts) A coin is tossed three times.

- List all the equally likely outcomes of this experiment. How many are there?
- List the outcomes on which exactly one head was tossed.
- What is the probability of the experiment resulting in exactly one head tossed?

4. (3pts) If a die is rolled, the odds against getting a 3 or a 5 on the roll are _____ to _____.

5. (3pts) If the probability of finding a quarter on the sidewalk during a daily walk is 10%, what are the odds against finding a quarter on the sidewalk during a daily walk?

6. (8pts) You play the following game, for which there is a \$1 charge: if you get a 3 on a roll of a die, you win \$4.50 (and your \$1 is returned), otherwise you win nothing.

a) What is the expected value for this game of chance?

b) If you play the game 25 times, how much do you expect to win (or lose)?

c) Use expected value to determine whether this game represents a fair bet.

d) Use odds to determine whether this game represents a fair bet.

7. (6pts) In a dealer's lot with 35 cars, 27 have power windows, 13 have power seats and 10 have both one of those features. If a car is randomly selected, what is the probability that

- a) it has at least one of the features?
- b) it has neither of the features?

8. (10pts) On any day at a convenience store, there is a 15% chance that it has run out of "Gong" brand of potato chips, and a 65% chance that at least one of the lights has burned out. Assume these two events are independent.

- a) What is the probability that the store has run out of "Gong" potato chips and has at least one light burnt out?
- b) What is the probability that the store has all lights working, but has run out of "Gong" potato chips?
- c) What is the probability that the store has run out of "Gong" potato chips, given that at least one of the lights has burned out?

9. (9pts) Two children are chosen at random from a group of 15 boys and 17 girls.

a) What is the probability that both children are boys?

b) What is the probability that the second child is a girl?

c) What is the probability that the second child is a girl, given that the first child was a girl?

Bonus. (5pts) Jorge and Manuela are separately asked to choose between strawberries and kiwifruit. They will get a snack only if they name different choices. If Jorge names strawberries 70% of the time and kiwifruit 30% of the time, and Manuela names strawberries 65% of the time and kiwifruit 35% of the time, what is the probability that they get a snack?