
Complete the following problems. Show all work and explain your reasoning.

1. Draw two cards successively and without replacement from a standard deck of 52 cards. Find the probability of each of the following:

- (a) getting a spade second given that you got a spade first

$$P(2 \text{ spades}) = \frac{13 \cdot 12}{52 \cdot 51}$$

- (b) no face cards

$$P(\text{no face cards}) = \frac{40 \cdot 39}{52 \cdot 51}$$

2. Consider the following game: roll a single fair die and win \$3 for a 6, \$2 for a 5, \$1 for a 4, and no payoff otherwise.

- (a) What is the expected value of this game?

$$E = \frac{1}{6} \cdot 3 + \frac{1}{6} \cdot 2 + \frac{1}{6} \cdot 1 + \frac{1}{2} \cdot 0 = 1$$

- (b) If you earn the winnings as mentioned above, but have to pay when you roll a 3, a 2, or a 1, what is a fair price to pay to play this game?

$$0 = \frac{1}{6} \cdot 3 + \frac{1}{6} \cdot 2 + \frac{1}{6} \cdot 1 + \frac{1}{2} \cdot x$$

$$0 = 1 + \frac{1}{2}x$$

$$-1 = \frac{1}{2}x$$

$$x = -2$$

So you should have to pay \$2 to play.

3. Were you in class on Monday November 23rd? If yes, prove it - what is the secret phrase?

Yes, yes I was. The secret phrase is "720 transformer".