

1. An assignment of probability must obey which of the following?

a) All of these reasons

b) The probability of an event is the sum of the outcomes in the sample space which make up the event.

c) The sum of all the probabilities of all outcomes in the sample space must be exactly 1.

d) The probability of any event must be a number between 0 and 1, inclusive.

2. Students at University X must be in one of the class ranks—freshman, sophomore, junior, or senior. At University X, 35% of the students are freshmen and 30% are sophomores. If a student is selected at random, the probability that her or she is either a junior or a senior is

a) 35%

b) 70%

c) 65%

d) 30%

35% freshman  
30% sophomores  
⇒ 65% freshmen or soph.  
100% - 65% = 35% jr or sr

3. In a particular game, a fair 6-sided die is tossed. If the number of dots showing is either four or five, you win \$1. If the number of spots showing is six, you win \$4. And if the number of spots showing is one, two, or three, you win nothing. You are going to play the game twice.

The probability that you win \$4 both times is

a) 1/36

b) 1/12

c) 1/6

d) 1/3

$$\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

1st play 2nd play

X	1	4	0
P	2/6	1/6	3/6

roll 4 or 5    roll 6    roll 1, 2 or 3

4. In a particular game, a fair 6-sided die is tossed. If the number of spots showing is either four or five, you win \$1. If the number of spots showing is six, you win \$4. And if the number of spots showing is one, two, or three, you win nothing. You are going to play the game twice.

The probability that you win money at least once in the two games is

a) .25

b) .5

c) .125

d) .75

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

lose    lose

See previous table.  $P(\text{win } \$) = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$

$$P(\text{win at least once}) = 1 - P(\text{don't win at all})$$

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

5. An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1. The conditional probability of A given B is

a) .3

b) .5

c) 1/6

d) .2

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

← Formula sheet

$$= \frac{0.1}{0.6} = \frac{1}{6}$$

6. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time when a person is lying. Suppose that a random sample of 5 suspects is subjected to a lie detector test regarding a recent one-person crime. Then the probability of observing no positive reading if all suspects plead innocent and are telling the truth is

a) .409

b) .590

c) .735

d) .00001

10% of time machine says an honest person is lying.  
⇒ 90% of time machine does not show positive (lie) for truthful person.

$$(0.90 \times 0.90 \times 0.90 \times 0.90 \times 0.90) = 0.90^5 = .590$$

All telling truth

7. If you buy one ticket in the Presidential Lottery, then the probability that you will win a prize is 0.11. If you buy one ticket each month for

7. If you buy one ticket in the Provincial Lottery, then the probability that you will win a prize is 0.11. If you buy one ticket each month for five months, what is the probability that you will win at least one prize?

$P(\text{win}) = .11$   
 $P(\text{lose}) = 1 - .11 = .89$

- a) .44  
 c) .50

$P(\text{win at least one}) = 1 - P(\text{lose every time})$   
 $= 1 - .89^5$   
 $\Rightarrow .44$

- b) .55  
 d) .89

Binomial  $n=5$   $p=.11$   
 Binomial cdf  $n=5, p=.11, lb=1, ub=5$   
 $\Rightarrow .44$

8. A die is loaded so that the number 6 comes up three times as often as any other number. What, then, is the probability of rolling a 6?

- a) .500  
 c) .125

x	1	2	3	4	5	6
p	c	c	c	c	c	3c

- b) .375

- d) .250

$c+c+c+c+c+3c=1 \Rightarrow c=\frac{1}{8}$     probs must sum to 1     $3(\frac{1}{8}) = .375$

9. Suppose we toss a penny and a nickel. Let A be the event that the penny is a head and B be the event that the nickel is a tail. The events A and B are

- a) dependent  
 c) Disjoint

- b) complements  
 d) independent