

**Math 101: Probability**

1. You have a standard shuffled deck of cards.
  - a. What is the probability of pulling a any queen?
  
  - b. What is the probability of pulling a number card valued 2-7 of hearts?
  
  - c. What is the probability of pulling two face cards in a row?
  
2. You have two 6 faced fair die.
  - a. What is the probability of rolling a 5 of any combination?
  
  - b. What is the Probability of rolling 6 with one of the dice showing a 2?
  
3. A particular genetic condition affects 4.25% of the population in a county of 15,000. Suppose there is a test for the condition that has an error rate of 1.625% (i.e., 1.625% false negatives and 1.625% false positives).

Fill in the table below.

	Has Condition	Does not have condition	Totals
Test positive			
Test negative			
Totals			

4. In how many ways can I arrange the six letters A, B, C, D, E, F?
  
5. five cards from a full deck are drawn. Write each probability in decimal form
  - a. What is the probability that they are all black?
  
  - b. What is the probability that they are all clubs?

**Solutions**

1. You have a standard shuffled deck of cards.
  - a. There are 4 queens in a deck of 52 cards  $\frac{4}{52} = \frac{1}{13}$
  - b. The number of cards valued 2-7 is 24 out of 52 cards  $\frac{24}{52} = \frac{3}{13}$
  - c. There are 16 face cards in a deck of 52 cards the probability  $(\frac{16}{52}) * (\frac{15}{51}) = \frac{20}{221}$
2. You have two 6 faced die.
  - a. There are two combinations to roll a 5:  $(\frac{2}{6}) * (\frac{2}{6}) = \frac{1}{9}$
  - b. One of the dice must be a 2 while the other must be a 4:  $(\frac{1}{6}) * (\frac{1}{6}) = \frac{1}{36}$
3. A particular genetic condition affects 4.25% of the population in a county of 15,000. Suppose there is a test for the condition that has an error rate of 1.625% (i.e., 1.625% false negatives and 1.625% false positives).
4. Fill in the table below.

	Has Condition	Does not have condition	Totals
Test positive	$637 - 10 = 627$	$0.1625 * 14363 = 233$	860
Test negative	$.01625 * 637 = 10$	$14363 - 233 = 14130$	14140
Totals	$0.0425 * 15000 = 637$	$15000 - 637 = 14363$	15000

5.  $8!$  Or 40320
6. five cards from a full deck are drawn. Write each probability in decimal form (show 4 decimal places)
  - a.  $(\frac{26}{52}) * (\frac{25}{51}) * (\frac{24}{50}) * (\frac{23}{49}) * (\frac{22}{48}) = 0.0253$
  - b.  $(\frac{13}{52}) * (\frac{12}{51}) * (\frac{11}{50}) * (\frac{10}{49}) * (\frac{9}{48}) = 0.0004$