

**MATH 5: HOMEWORK 16**  
**BEGINNING PROBABILITY – 1.**

1. Write each of the following expressions in the form  $2^n 5^k$ :

(a)  $\frac{2^2 5^8}{2^5 5^3}$       (b)  $(2^3)^2 10^2 5^{-3}$       (c)  $\frac{2^8 5^{-14}}{10^{-3}}$

2. Solve the following equations:

(a)  $5 - 2(3 - x) = -2$       (b)  $1 - \frac{2}{3}(x + 1) = x$       (c)  $\frac{x - 2}{x - 4} = -2$

3. In the game of roulette, there are 37 slots, numbered 0 through 36. Of numbers 1–36, half are red, the other half are black (zero has no color). What is the probability of hitting

- (a) A number between 1–12
- (b) An even number other than zero
- (c) A red number or zero
- (d) If you bet \$15 on odd numbers (i.e., you win if you roll one of odd numbers), what is the probability of losing?

4. You roll two dice, one red, one black. What is the probability of rolling two ones? Of rolling a 4 and a 6?

5. The standard card deck has 4 suits (hearts, diamonds, spades, and clubs); each suit has 13 different card values: 2 through 10, jack, queen, king, and ace.  
If you randomly draw one card, what is the probability of getting
- (a) The queen of spades
  - (b) A face card (i.e., jack, queen, or king)
  - (c) A black king
  - (d) Anything but the queen of hearts

6. I had drawn a card from the deck, and it turned out to be an ace. Now I am drawing one more card from the same deck. What is the probability that it will be an ace again?

7. What is the probability that a randomly chosen person was born
- (a) in January?
  - (b) on Feb 5?
  - (c) on Sunday?
  - (d) On Sunday in January? [Hint: among all the people born in January, what fraction was born on Sunday?]

When doing this problem, you can ignore leap years and assume that birthdays are randomly distributed among all days of the year, so each day is equally likely; in real life it is not quite true.

8. When tossing a coin, it can land head up or tails up (we will write H for head and T for tails).
- (a) If we toss a coin 5 times, what is the probability that all 5 will be heads?
  - (b) If we toss a coin 5 times, what is the probability of getting this sequence of results: HHTHT? Is it more likely or less likely than getting all 5 heads?