Week 3 Worksheet for Math 61

1. (a) How many integers in $\{1, ..., 1000\}$ are divisible by 4?

   (b) How many integers in $\{1, ..., 1000\}$ are divisible by 6?

   (c) How many integers in $\{1, ..., 1000\}$ are divisible by both 4 and 6?

   (d) How many integers in $\{1, ..., 1000\}$ are divisible by 4 or 6?

   (e) How many integers in $\{1, ..., 1000\}$ are divisible by 4 or by 6 but not both?

2. Let A and B be dice with the following tuples (a tuple is an ordered list of numbers) as the numbers on their sides. What are the odds of rolling a sum of 7?

   (a) $A = (1, 2, 3, 4, 5, 6)$
   $B = (1, 2, 3, 4, 5, 6)$

   (b) $A = (1, 1, 2, 5)$
   $B = (2, 6, 6, 6)$

   (c) $A = (0, 2, 4, 4, 6, 8)$
   $B = (2, 3, 4, 5, 6, 7, 8, 9)$

3. (a) How many functions are there from a set of m elements to a set of n elements?

   (b) How many injections are there from a set of m elements to a set of n elements?

   (c) How many bijections are there from a set of m elements to a set of m elements?

   (d) How many surjections are there from $\{1, ..., n\}$ to $\{1, 2, 3\}$?
   Hint: Apply inclusion-exclusion

4. What are the odds of having a royal flush in a hand of 6 cards?