These questions will also serve as *part of* the warmup for recitation 7

1. 5-card Poker questions: How different ways can you get:

   (a) Total number of hands

   (b) A hand with at least one ace

   (c) A straight (e.g. \{4, 5, 6, 7, 8\}, mixed suits)

   (d) Flush (i.e. 5 cards of same suit)

   (e) Straight flush

   (f) One pair

   (g) Two pair

   (h) Three of a kind

   (i) Full house

   (j) 4 of a kind

   (k) Royal flush
2. Use the binomial theorem to expand \((x - \frac{3}{2})^5\).

3. Use the binomial theorem to prove:
\[
\binom{100}{6} + \binom{100}{2} + \binom{100}{4} + \binom{100}{6} + \cdots + \binom{100}{98} + \binom{100}{100} = \binom{100}{1} + \binom{100}{3} + \binom{100}{5} + \cdots + \binom{100}{97} + \binom{100}{99}.
\]

4. Assuming you have enough pennies, nickels, dimes, and quarters, how many ways are there to make change for a 50 cents? How does your answer change for making change for a dollar? How about if you can use a half-dollar?

5. If the permutations of 1,2,3,4,5,6 are written in lexicographic order with 123456 in position #1, 123465 in position #2, etc.
   (a) find the permutation immediately after 246531
   (b) find the permutation immediately before 534126
   (c) find the permutation in position #483