Homework set 0, CSE 202

Do you know how to do these problems? No need to turn this set in.

1. A shelf contains 24 books. How many ways can 6 books be selected from these 24 with the restriction that no two selected books can be adjacent?

2. 8 Red and 9 Blue jellybeans are distributed randomly to 4 students. What is the probability that each student got *at least one* jellybean of each color?

3. How many 5-card hands can be formed from an ordinary deck of 52 cards if *exactly two* suits are present in the hand?

4. ,If A and B are events in a probability space with $Pr(A) = \frac{1}{3}$, $Pr(B) = \frac{1}{4}$ and $Pr((A \cap B)^c) = \frac{11}{12}$, then what is $Pr((A \cup B)^c)$?

5. Prove by induction that $2^n > n^2$ for $n > 4$.

6. A sequence is defined by: $a(1) = 1$ and $a(n+1) = 3a(n) - 1$ for $n \geq 1$. What is $a(100)$?

7. How many sequences of length n made up of 1, 2 and 3 do not have *two consecutive repeated* symbols?
(For example, 123121213231 would be allowed but 121123213212 would not.)

8. What is the general solution to the recurrence: $x(n+2) = 6x(n+1) - 9x(n)$, $n \geq 0$, with $x(0) = 0, x(1) = 1$?

9. A valid password P consists of 5 characters taken from the sets of 26 letters $\{A, B, C, \ldots, Z\}$ and 10 numbers $\{0, 1, 2, \ldots, 9\}$. However, P must have at least one number and at least one number, and furthermore, P cannot have both of the symbols O and 0 in it. How many valid passwords are there?

10. Suppose there are n professors and m students. How many ways are there to form k (nonempty) committees using all $m + n$ people? How many ways are there so that each committee has at least one professor? How many ways are there so that each committee has at least one professor and at least one student?