You can only use the faculty approved calculator with sticker.
Pens, pencils, erasers, and straight edges only. No crib sheets. NO CELL PHONES.
If you have a difficulty you may try making REASONABLE assumptions. State the
assumption and how that assumption limits your answer. Justify your responses.

1) Four married couples have bought 8 seats in the same row for a concert. In how many ways can they be seated:
   a) With no restrictions?
   b) If each couple is to sit together?
   c) If all the men sit together to the right of all the women?

2) In an engineering conference, 20% of the attendees are electrical engineers. Of these electrical engineers, 75% gave talks. Of those who are not electrical engineers, 20% gave talks. What is the probability that a randomly selected lecturer is an electrical engineers?

3) The cdf of X is as follows:

$$F(x) = \begin{cases} 0.00 & x < 1 \\ 0.20 & 1 \leq x < 3 \\ 0.40 & 3 \leq x < 4 \\ 0.45 & 4 \leq x < 6 \\ 0.7 & 6 \leq x < 12 \\ 1.0 & x \geq 12 \end{cases}$$

   a) Find the probability mass function of X, $f(x)$
   b) Graph the pmf of X
   c) Using just the cdf, compute the probability that X is between 3 and 6, inclusive
   d) Find the expectation and the variance of X.
   e) If another random variable Y=X+1 is formed, find the E[Y].

4) Identical computer components are shipped in boxes of 5. About 15% of components have defects. Defects on components are independent of one another and the boxes are tested in a random order.
   a) What is the probability that a randomly selected box has only non-defective components?
   b) What is the expected number of non-defective components?
   c) What is the standard deviation of the number of non-defective components?
   d) What is the probability that at least 8 of randomly selected 10 boxes have only non-defective components?
   e) What is the distribution of the number of boxes tested until a box without defective components is found? What are its parameters?

5) Vehicles pass through a junction on a busy road at an average rate of 300 per hour.
   a) Find the probability that none passes in a given minute.
   b) What is the expected number passing in two minutes?
   c) Find the probability that this expected number actually pass through in a given two-minute period.