Name:

ID:

Section: 9 AM   10 AM

1) A palindrome is a sequence of letters that reads the same backwards as forwards (for example *aabaa* and *radar* are palindrome; *abb* is not). How many palindrome are there with 7 letters ?

2) The lifetime (in hours) of an electrical component is a random variable with cumulative distribution function

$$F(x) = 1 - e^{-x/50} \ , \ x > 0$$

Find the probability that the lifetime of such a component will exceed 70 hours.

3) How many bit strings on $\{0,1\}^6$ starts with 00 or ends with 1 ?

4) The joint pdf of a couple (X,Y) is given by

$$f(x,y) = 6y \ , \ 0 < y < x < 1$$

Find the marginal pdf of X

5) Refer to question 4, find the probability that Y is less than 0.5 given that X is 0.7

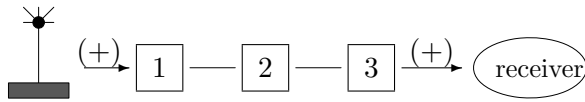6) On a math test, the scores of 7 randomly selected students were:

$$54, 46, 65, 55, 57, 59, 63$$

The course instructor has decided to give each student a raise of 10 points. Find the standard deviation for the new grades

(summary calculations for the scores before raise gave: $\sum x = 399$ and $\sum x^2 = 22981$)

7) 54% of Lebanese adults are male, 9% are divorced, and 61% are either male or divorced. Find the probability that a randomly selected person is male but not divorced.

8) A transmitter is sending a binary code (+ and − signals) that must pass through three relay signals before being sent on the receiver (see figure). At each relay station, there a 25% chance that the signal will be reversed.

If a signal + is sent, find the probability that a signal + is received.

9) In a string of 12 Christmas tree light bulbs, 3 are defective. The bulbs are selected at random and tested, one at a time. Find the probability that the third defective bulb is the tenth selected.

10) Let $f(x,y) = 3/2$, $x^2 \leq y \leq 1$, $0 \leq x \leq 1$ be the joint pdf of X and Y. Find $P(X+Y < 3/4)$

11) A hospital receives two-fifth of its flu vaccine from company A and the remainder form company B. Each shipment contains a large number of vials vaccine. From company A, 3% of the vials are ineffective; From company B, 2% of the vials are ineffective. The hospital tests 5 randomly selected vials form one shipment and finds that 1 is ineffective. Find the probability that this shipment came form company A.

12) A player rolls a die. He stops at the fourth roll or when a six appears, whichever occurs first. Let X be the number of rolls. Find the pdf for X.