EE381 Homework #4

1) Let S be the sample space *S={0, 1, 2…}*. Determine if the following function is the probability function of the sample space *S*:

$$f(x) = (1-r)^x r$$

where *r* belongs to *(0, 1)* and *x=0, 1, 2,…*

2) Let X be a random variable giving the number of aces in a random draw of 4 cards from an ordinary deck of 52 cards.
   a) Construct a table showing the probability distribution of X.
   b) Obtain its distribution function

3) The probability function for random variable X is provided in the following table:

x	1	2	3
$f(x)$	1/2	1/3	1/6

   Find the distribution function F(x) for the random variable X, and plot it.

4) The following table shows the distribution function of a random variable X.

x	1	2	3	4
$F(x)$	1/8	3/8	3/4	1

   Determine:
   a) The probability function
   b) $P(1 \leq X \leq 3)$
   c) $P(X \geq 2)$
   d) $P(X < 3)$
   e) $P(X > 1.4)$

5) The joint probability function of two discrete random variables *X* and *Y* is given by *f(x,y)=cxy* for *x=1,2,3* and *y=1,2,3*, and equals zero otherwise. Find
   a) The constant *c*
   b) P(X=2, Y=3)
   c) $P(1 \leq X \leq 2, Y \leq 2)$
   d) $P(X \geq 2)$
   e) $P(Y = 3)$

6) Find the marginal probability function of random variables X and Y in question (5) above. Determine whether X and Y are independent.

7) For the distribution of question (5), find the conditional probability function of:
   a) X given Y
   b) Y given X

Note: Your answers should show your step-by-step work. Answers which have only final results are not accepted.