ASSIGNMENT 1
Probability Statistics & Linear Algebra

1. Two six-sided dice are rolled. What is the probability that the sum of the two numbers is 7, given that at least one of the dice shows a 4?

2. A continuous random variable X has a pdf $f(x) = 3x^2$, $0 \le x \le 1$. Find a and b such that $P(X \le a) = P(X > a)$. $P(X > b) = 0.05$.

3. Let X be a random variable with pdf $f(x) = \begin{cases} \frac{1}{3}e^{\frac{-x}{3}}, & x \ge 1 \\ 0, & otherwise \end{cases}$,

   Find (a). $P(X > 5)$ (b) $E(X)$ (c) $Var(X)$.

4. In a distribution, the mean is 60, and the standard deviation is 8. Use Chebyshev's Inequality to estimate the proportion of data that falls within 44 and 76.

5. A sortie of 20 aeroplanes is sent on an operational flight. The chances that an aeroplane fails to return is 5%. Find the probability that (i) one plane does not return (ii) at the most 5 planes do not return, and (iii) what is the most probable number of returns?

6. X is a Poisson variable and it is found that the probability that x = 0 is two-thirds of the probability that X = 1. Find the probability that X = 0 and the probability that X = 3.What is the probability that X exceeds 3.

7. ABC Company has 2,000 accounts receivable. The mean and standard deviation are $300 and $50, respectively. Assume that the accounts are normally distributed.

   a. How many accounts exceed $400?

   b. What is the probability that an account selected at random will be between $200 and $350?

   c. Forty percent of the accounts exceed what dollar amount? (Hint: Fifty percent of the accounts are for more than $300.)

   d. Twenty percent of the accounts are below what dollar amount?

8. Find the correlation co-efficient for the following data

x	78	89	97	69	59	79	68	57
y	125	137	155	112	108	138	120	108

ASSIGNMENT 2
Probability Statistics & Linear Algebra

1. Given the data points (1, 4), (2, 6), (3, 9),(4,11), (5,17) fit a second-degree polynomial. What is the equation of the parabola?

2. Test the hypothesis that the mean of Group A (n=25, mean=45, s=8) is equal to the mean of Group B (n=30, mean=50, s=10) using a t-test.

3. Solve the system of linear equations using Cramer's Rule:
$$3x + 2y + z = 7$$
$$2x - y + 2z = 2$$
$$x + 3y - z = 1$$

4. Given a matrix $C = \begin{bmatrix} 4 & 2 \\ 2 & 5 \end{bmatrix}$, compute the LU-Decomposition of C.

5. Given a matrix $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, compute the Singular Value Decomposition of B.

6. Determine whether the set of all 2x2 matrices forms a Euclidean vector space. Justify your

7. Assume that

$$u = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}, \qquad v = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \qquad w = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

Make the set {u,v,w} orthogonal.