1. Probability density function of a continuous random variable is $f(x) = \begin{cases} \frac{1}{2}x, 0 \le x \le 2 \\ 0, elsewhere \end{cases}$

    i. Proof that X is a continuous random variable

    ii. Find $P(X \le 1)$

    iii. Find distribution function, F(x)

2. Distribution function of a continuous random variable Y is given by $F(y) = \begin{cases} 0, y < 0 \\ y^2, 0 \le y \le 1 \\ 1, y > 1 \end{cases}$

Find

    i. $P(\frac{1}{4} \le Y \le \frac{1}{2})$

    ii. $P(Y > \frac{1}{2})$

    iii. $P(\frac{1}{2} < Y < 1)$

    iv. Probability density function , f(y)

3. A continuous random variable X that has the distribution function

$$F(x) = \begin{cases} 0, x < -1 \\ \dfrac{1 + x}{8}, -1 \le x \le 0 \\ \dfrac{1 + 3x}{8}, 0 \le x \le 2 \\ \dfrac{5 + x}{8}, 2 \le x \le 3 \\ 1, x > 3 \end{cases}$$

    i. Probability density function of X

    ii. $P(1 \le X \le 3)$

    iii. $P(3 < 2X < 5)$