

12022 0263

أحمد ناصر الشبيخ خلدون

4.2.1/

$$f_X(x) = \begin{cases} 0 & x < -1 \\ (x+1)^2 & -1 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$$

$$a) P(x > \frac{1}{2}) = 1 - P(x \leq \frac{1}{2}) = 1 - f_X(\frac{1}{2}) = 1 - \frac{3}{4} = \frac{1}{4}$$

$$b) f_X(\frac{3}{4}) - f_X(-\frac{1}{2}) = \frac{3/4 + 1}{2} + \frac{-1/2 + 1}{2} = \frac{7}{8} - \frac{1}{4} = \frac{5}{8}$$

$$c) P(|x| \leq 1/2) = P(-1/2 \leq x \leq 1/2) = f_X(\frac{1}{2}) - f_X(-\frac{1}{2}) = 3/4 - 1/4 = 2/4 = \boxed{1/2}$$

$$d) f_X(a) = 0.8 \rightarrow \frac{a+1}{2} = 0.8 / a+1 = 1.6 \rightarrow \boxed{a = 0.6}$$

4.3.1/

$$f_X(x) = \begin{cases} cx & 0 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

$$a) \int_0^2 cx dx = 1 \rightarrow c \int_0^2 x dx = 1$$

$$c \left[\frac{x^2}{2} \right]_0^2 = 1 \rightarrow c \cdot \frac{4}{2} = 1 \rightarrow \boxed{c = \frac{1}{2}}$$

$$b) P(0 \leq x \leq 1) = \int_0^1 \frac{1}{2} x dx = \frac{1}{2} \left[\frac{x^2}{2} \right]_0^1 = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$c) \int_0^{1/2} \frac{1}{2} x dx = \frac{1}{2} \left[\frac{x^2}{2} \right]_0^{1/2} = \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8}$$

$$d) x < 0 \rightarrow f_X(x) = 0$$

$$0 \leq x \leq 2 \rightarrow f_X(x) = \int_0^x \frac{1}{2} t dt = \frac{1}{2} \frac{x^2}{2} = \frac{x^2}{4}$$

$$x > 2 \rightarrow f_X(x) = 1$$

$$f_X(x) = \begin{cases} 0 & x < 0 \\ x^2/4 & 0 \leq x \leq 2 \\ 1 & x > 2 \end{cases}$$