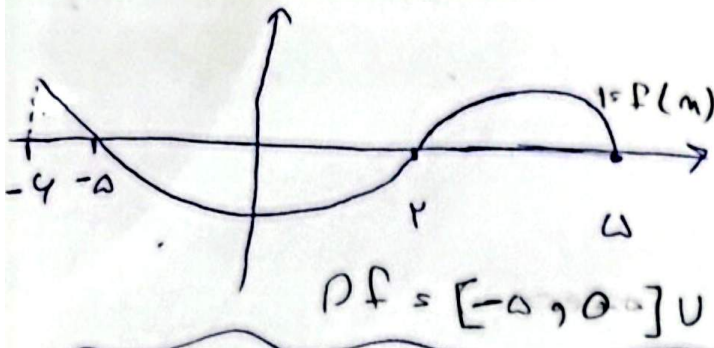


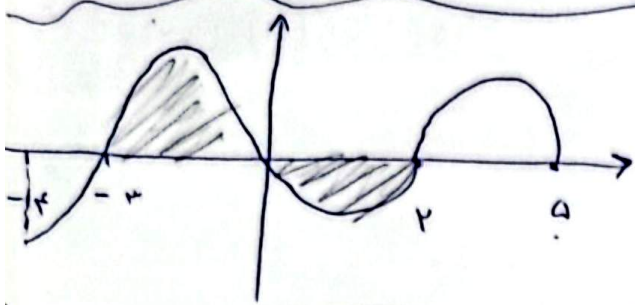
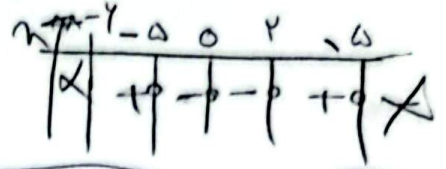
السؤال الثاني / V / (م)



$$\lim_{n \rightarrow \infty} \frac{f(n)}{n} = 0$$

$\downarrow$
 $n \approx 0, 2, -0, 2, 0$

$$y = \sqrt{n f(n)} \quad (1)$$



$$\lim_{n \rightarrow \infty} \frac{f(n)}{n} = 0$$

$\downarrow$
 $n \approx 0, 2, -0, 2, 0$

$$\sqrt{\frac{-n}{f(n)}} \approx 0$$

$0, 2, -0, 2, -0, 2$

$$Df = (-2, 0) \cup (0, 2)$$

$$f(n) - 2f(2) = n^2 - 2n + 2 \rightarrow f(n) - 2f(2) = 2 - 4 + 2$$

$$f(-2) = 2 + 4 + 2 + f(2) \rightarrow f(2) = -2$$

$f(-2) = 1$

$$f(n) = \begin{cases} n - \sqrt{n+2} & n > 2 \\ 2n + 2 & n \leq 2 \end{cases}$$

$$f(f(2)) + f(f(1)) = 2 + 2 = 4$$

$$f(n-1) - f(n) = 4n + 2 \rightarrow a(n-1) - b(n-1) + 2 = a(n^2-1) - b(n-1) + 2 = 4n + 2$$

$$a(n-1)^2 - b(n-1) + 2 = a(n^2-1) - b(n-1) + 2 = 4n + 2$$

$\rightarrow -2an + a + b = 4n + 2 \rightarrow a - b = -2 - 2 = -4$

$$-2a = 4$$

$a = -2$

$$\frac{2f(2) + f(-1)}{f'(2)} = \frac{2+0}{1} = 2$$

$$f(n) = n^2 - 2n + 1 \quad (2)$$

$$f(2) = 4 - 4 + 1 = 1$$

$$f(-1) = 1 + 2 + 1 = 4$$

$$f(2) = 4 - 4 + 1 = 1$$

$$\frac{\cancel{19} f(\cancel{1}) - \cancel{1} f(\cancel{-1})}{\cancel{f(1)}} = \frac{19 - 1}{1} = \left(\frac{18}{1} \right)$$

$$f(n) = \begin{cases} n+1 & n \geq 1 \\ n^2 & n < 1 \end{cases} \quad (V) \quad \star$$

$$f(1) = 1+1$$

$$f(-1) = 4+1$$

$$\frac{19}{19}$$

$$\frac{\cancel{f(1)} - \cancel{f(1)}}{\cancel{f(1)}} = \frac{4-4}{4-4} = 0$$

$$f = \{(1,4), (4,1), (1,1), (4,4)\} \quad (A)$$

$$f(f(\sqrt{x}-1)) = ?$$

$$f(n) = \frac{n^2 + kn + a}{n^2 + kn + a} \quad (9)$$

$$f(\sqrt{x}-1) = \frac{(\sqrt{x}-1)^2 + k(\sqrt{x}-1) + a}{(\sqrt{x}-1)^2 + k(\sqrt{x}-1) + a} = \frac{\cancel{1} + \cancel{k} - \cancel{k}\sqrt{x} + \cancel{k}\sqrt{x} - \cancel{1} + a}{\cancel{1} + \cancel{k} - \cancel{k}\sqrt{x} + \cancel{k}\sqrt{x} - \cancel{1} + a} = \frac{a}{a} = 1$$

$$\left(f\left(\sqrt{n}\right) \right)^2 - f(n) = n^2 + \frac{1}{n^2} + 2 - n^2 - \frac{1}{n^2} = 2 \quad f(n) = n^2 + \frac{1}{n^2} \quad (10)$$