

FRQs:

$$1) x(t) = t^3 - 2t^2 - 4t + 6 \quad t \geq 0$$

$$a) v(t) = 3t^2 - 4t - 4 \quad (1)$$

$$b) a(t) = 6t - 4 \quad (1)$$

$$c) \text{AROC: } \frac{x(4) - x(0)}{4 - 0} = \frac{22 - 6}{4} = 4 \quad (1)$$

Instantaneous:

$$x'(t) = 3t^2 - 4t - 4$$

$$3t^2 - 4t - 4 = 4 \quad (1)$$

$$3t^2 - 4t - 8 = 0$$

$$t = \frac{4 \pm \sqrt{16 - 4(3)(-8)}}{2(3)}$$

$$t = \frac{4 \pm \sqrt{112}}{6}$$

$$\frac{4 + \sqrt{112}}{6} \quad (1)$$

$$d) 3t^2 - 4t - 4 = 0$$

$$(3t+2)(t-2) = 0$$

$$t = -\frac{2}{3}, 2 \quad (1)$$

t	x(t)
0	6
2	-2
4	22

(2)  $\left. \begin{array}{l} > 8 \\ > 24 \end{array} \right\}$

TDT: 32  
units  
(1)

$$2) f(x) = \sqrt{1 - \sin x} = (1 - \sin x)^{1/2}$$

$$a) \mathbb{R} \quad (1)$$

$$b) f'(x) = \frac{1}{2}(1 - \sin x)^{-1/2} \cdot -\cos x$$

$$-C \begin{matrix} S \\ -S \\ C \end{matrix}$$

$$f'(x) = \frac{-\cos x}{2\sqrt{1 - \sin x}} \quad (2)$$

$$c) 1 - \sin x > 0$$

$$-\sin x > -1$$

$$\sin x < 1$$

$$1 - \sin x = 0$$

$$\sin x = 1$$

$$x \neq \frac{\pi}{2} + 2\pi k$$

$$\left\{ x \mid x \neq \frac{\pi}{2} + 2\pi k \right\} \quad (3)$$

where  $k \in \mathbb{Z}$

$$d) f'(0) = \frac{-\cos 0}{2\sqrt{1 - \sin 0}} = \frac{-1}{2\sqrt{1}} = -\frac{1}{2} \quad (1)$$

$$f(0) = \sqrt{1 - \sin 0} = 1 \quad (1)$$

$$y - 1 = -\frac{1}{2}(x - 0)$$

$$y - 1 = -\frac{1}{2}x \quad (1)$$