



9)

a) In $\triangle ADC$

$DC = 1$ given

$$\theta = \frac{\pi}{5}$$

$\angle DCA = \theta$ given

But $AC = 1$

$\therefore \triangle DCA$ is (isos \triangle)

$\therefore \angle CDA = \angle DAC$

sum of \angle s of a triangle = $180^\circ = \pi$

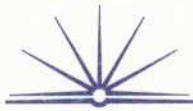
$$\angle DCA + \angle CDA + \angle DAC = \pi$$

$$\frac{\pi}{5} + 2 \cdot \angle CDA = \pi$$

$$2 \cdot \angle CDA = \frac{\pi}{1} - \frac{\pi}{5} = \frac{4\pi}{5}$$

$$\therefore \angle ADC = \frac{\frac{4\pi}{5}}{2} = \frac{2\pi}{5}$$

$$\angle ADC = 2\theta$$



$$\text{ii) } x^2 - x - 1 = 0.$$

$$x(x-1) - 1 = 0.$$

$\angle BAC = \frac{3\pi}{5}$ given, but $\angle DAC = \frac{2\pi}{5}$ proved before

$\Rightarrow \angle BAD = \frac{\pi}{5}$ so $\triangle DBA$ is isos

so $BD = DA = (x-1)$.

$$\Rightarrow x^2 - x - 1 = 0$$

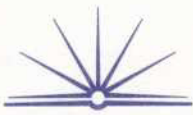
$$\text{iii) } \cos \frac{\pi}{5} = \frac{1 + \sqrt{5}}{4}.$$

$$(AB)^2 = (BC)^2 + (CA)^2 - 2(BC)(CA) \cos C$$

$$1^2 = x^2 + 1 - 2(1)(x) \cos \frac{\pi}{5}$$

$$1 = (x^2 + 1) - 2x \cos \frac{\pi}{5}$$

$$\cos \frac{\pi}{5} =$$



$$b) \frac{dv}{dt} = 2e^t + 2e^{-t}$$

$$j) \frac{dv}{dt} = 2e^0 + 2e^0 \\ = 4$$

$$ii) \int 2e^t + 2e^{-t} \frac{dv}{dt} = 2 \cdot \frac{1}{t} e^t + \left(2 \cdot -\frac{1}{t} e^{-t} \right) + c.$$

$$= \frac{2}{t} e^t - \frac{2}{t} e^{-t}$$

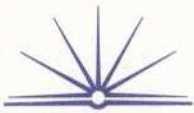
$$v = \frac{2}{t} (e^t - e^{-t})$$

$$iii) 2e^{3t} - 3e^t - 2 = 0 \quad \text{when } v = 3.$$

$$3 = \frac{2}{t} (e^t - e^{-t})$$

$$3 = \frac{2e^t}{t} - \frac{2e^{-t}}{t}$$

$$\frac{2e^t}{t} - \frac{2e^{-t}}{t} - 3 = 0.$$



iv) $v = 3$.