9)

a) In Δ ADC

DC = 1 given $\qquad \theta = \frac{\pi}{5}$.

$\angle DCA = \theta$ given

But AC = 1

So Δ DCA is (isos Δ)

so $\angle CDA = \angle DAC$

sum of $\angle$s of a triangle $= 180° = \pi$.

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

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

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

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

$\angle ADC = 2\theta$

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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

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

$\therefore BD = DA = (x-1)$.

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

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

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

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

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

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

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

i) $\frac{dV}{dt} = 2e^{0} + 2e^{0}$
$= 4$

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

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

$V = \frac{2}{t}\left(e^{t} - e^{-t}\right)$

iii) $2e^{3t} - 3e^{t} - 2 = 0$ when $V = 3$.
$3 = \frac{2}{t}(e^{t} - e^{-t})$

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

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

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iv) $v = 3$.