9a) i $\angle BAC = \frac{3\pi}{5}$

$= 108°$

II In $\triangle ABC$, $\angle ABC = \angle ACB = \theta$ given,

$2\theta + 108° = 180°$ $\angle$ sum $\triangle$

$2\theta = 72$

$\theta = 36°$

II In $\triangle ACD$, it is isoceles so $\angle CAD = \angle ADC = y°$

$2y° + \theta = 180$

$2y° + 36° = 180$

$2y = 144$

$y = 72°$

$\therefore \angle DAC = 72°$ and $\angle ADC = 72°$

III $\angle BAC = \angle BAD + \angle DAC$.

$108° = \angle BAD + 72°$

$\therefore \angle BAD = 36°$

IV $\angle BDA = 180° - (36 \times 2)$ $\angle$ sum $\triangle$.

$= 108°$

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as previously

V $\angle ADC$ [illegible] $= 72°$ shown

and $\theta = 36°$ also shown.

[illegible] $2\theta = 72°$

$\therefore \angle ADC = 2\theta$

Show $\triangle DBA$ [illegible] $|||$ $\triangle ABC$.

Angle $\angle BAC = 108° = \angle BDA$ Show in p IV and before I.

Angle $\angle ABC$ [illegible] common.

Angle $\angle BCA = 36° = \angle BCA$ as in III and $\theta = 36°$.

$\therefore \triangle DBA ||| \triangle ABC$ because they are equiangular.

$x^2 - x - 1 = 0$

expression for x

(iii) $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$.

$\cos \dfrac{A}{5} \rightarrow 36°$

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

when $t=0$. $\frac{dV}{dt} = 2 + 2$

$= 4$.

∴ enters at $4\ ms^{-1}$.

ii) $V = \int 2e^t + 2e^{-t}$.

$= e^t + e^{-t}$.

* not constant since tank is initally empty