C3

1; $f(0.3) \Rightarrow -ve$
$f(0.4) \Rightarrow +ve$ Sign change So root is between.

ii 0.395
$x_1 = 0.3960$
$x_2 = 0.3954$
$x_3 = 0.3953$
$x_4 = 0.39531$
$x_5 = 0.39531$.

2; $\cot x + 3 - \operatorname{cosec}^2 x = 0$.

* $1 + \cot^2 x = \operatorname{cosec}^2 x$

$\cot x + 3 - (1 + \cot^2 x) = 0$.
$\cot x + 3 - 1 - \cot^2 x = 0$.
$\cot x + 2 - \cot^2 x = 0$.
$0 = \cot^2 x - \cot x - 2$.

ii $26.6°$, $206.6°$, $135°$, $315°$

3; $\dfrac{9 - 3x}{(x^2 + 9)^{3/2}}$

ii when $x = 3$ $\dfrac{dy}{dx} = \dfrac{9 - 3(3)}{((3)^2 + 9)^{3/2}}$

$= \dfrac{9 - 9}{18^{3/2}} = \dfrac{0}{18^{3/2}} = 0$.

at $x = 3$ $y = \dfrac{3 + 3}{\sqrt{3^2 + 9}}$

$= \dfrac{6}{\sqrt{18}} = \dfrac{6}{\sqrt{9 \times 2}} = \dfrac{6}{3\sqrt{2}} = \dfrac{2}{\sqrt{2}}$.

rationalise denominator $\Rightarrow \dfrac{2}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{2\sqrt{2}}{2} = \sqrt{2}$.

ie tangent at $x = 3$ is $y = \sqrt{2}$

4 i Translate 2 left in x direction
Stretch factor 3 in y direction.

ii 4.871.

5. $A = 9000$

$4500 = 9000 e^{-36k}$ As $V = 4500$ when $t = 36$.

$\frac{1}{2} = e^{-36k}$.

$\ln 0.5 = -36k$

$k = \frac{\ln 0.5}{-36} \approx 0.019254$

i £6364

ii 84 months

6. 90π.

7. $AB + BD + DF + AF = 26$.

$AB + 5 + 8 + AF = 26$.

$AB + AF = 13$.

$AF = CD + DE$.

$AF = 5\cos x + 8\sin x$

$AB = EF - BC$.

$AB = 8\cos x - 5\sin x$

$8\cos x - 5\sin x + 5\cos x + 8\sin x = 13$.

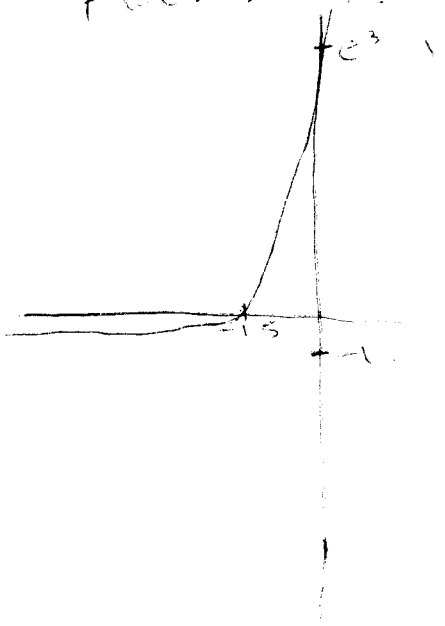
$13\cos x + 3\sin x = 13$.

7 ii $R = 13.34$ $\alpha = 12.99°$

iii $26.0°$

8 i $f(x) > -1$.

ii



Crosses at $(-1.5, 0)$ and $(0, e^3 + 1)$

Asymptote at $y = 1$.

iii $x = \ln 2 - 1.5$.