Question 2.

a. $y = e^{2x}$.

gradient $(m) = y'$

$\therefore y' = 2e^{2x}$

@ $(0, 1)$

$y' = 2 \times e^{0}$

$y' = 2 = m$.

$y_2 - y_1 = m(x_2 - x_1)$.

$y - 1 = 2(x - 0)$

$y = 2x + 1$

bi. $y = x \sin x$.

$y' = x \times \cos x + \sin x \times 1$.

$= x \cos x + \sin x$.
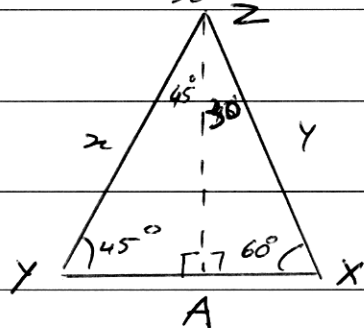
ii. $y = \dfrac{\ln x}{x^2}$

$y' = \dfrac{x^2 \times \frac{1}{x} - \ln x \times 2x}{x^4}$

$= \dfrac{\frac{x^2}{x} - 2x \ln x}{x^4}$

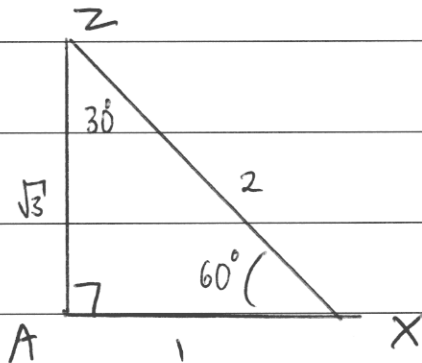$= \dfrac{x - 2x \ln x}{x^4}$
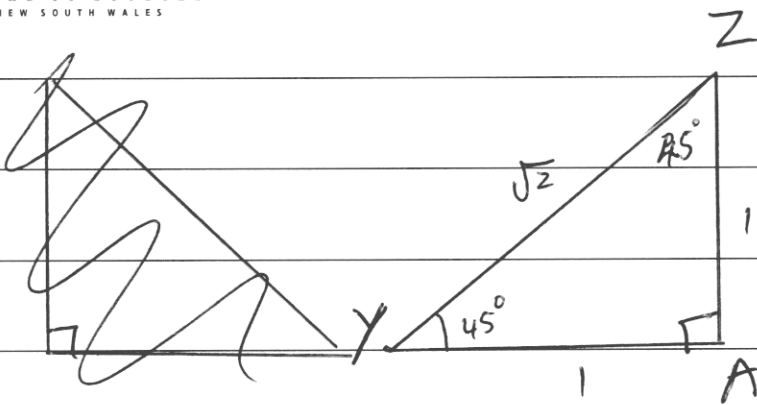
$= \dfrac{1 - 2\ln x}{x^3}$.

c.

Construct ZA so that $Y\hat{A}Z = 90°$

$\therefore Y\hat{Z}A = 45°$

$\therefore \triangle ZAY$ is equilateral

Z

$\sqrt{2}$ 45°

45°   1

Y

1 A

Z

30°

$\sqrt{3}$ 2

60°

A   1   X

$\therefore \quad \dfrac{x}{y} = \dfrac{\sqrt{2}}{2}.$

d i. $\displaystyle \int \cos 3x \, dx$

$= \dfrac{1}{3} \sin 3x + c.$

ii. $\displaystyle \int_0^1 \left(e^{5x} - 1 \right) dx.$

try: $e^{5x} - x. \quad \therefore \quad \dfrac{dy}{dx} = 5 e^{5x}$

$= \left[\dfrac{1}{5} e^{5x} - x \right]_0^1$

$= \left(\dfrac{1}{5} e^5 - 1 \right) - \left(\dfrac{1}{5} e^0 - 0 \right).$

$= 28.68263182 - \dfrac{1}{5}.$

$= 28.48 \ (2dp) \ u^2.$

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