BOARD OF STUDIES
NEW SOUTH WALES

a.) $y = e^{2x}$ $(0,1)$

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

when $x = 0$

$y' = 2e^{0}$

$= 2$

$y - 1 = 2(x)$

$y - 1 = 2x$

$-2x + y - 1 = 0$

$2x - y + 1 = 0$

b.) i.) $y = x \sin x$

$y' = x \cos x$

ii.) $y = \frac{\ln x}{x^2}$

$\frac{vu' - uv'}{v^2}$

$u = \ln x \quad u' = \frac{1}{x}$

$v = x^2 \quad v' = 2x$

$y' = \frac{x^2 \times \frac{1}{x} - \ln x \times 2x}{(x^2)^2}$

$= \frac{\frac{x^1}{x} - 2x \ln x}{x^4}$

$= \frac{1 - 2x \ln x}{x^4}$

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NEW SOUTH WALES

c.) $\angle YZX = 75^\circ$ (angle sum of triangle)

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{4}{\sin 45^\circ} = \frac{x}{\sin 60^\circ}$$

$$\frac{4}{\frac{1}{\sqrt{2}}} = \frac{x}{\frac{\sqrt{3}}{2}}$$

$$4 = \frac{x}{\frac{\sqrt{3}}{2}} \times \frac{1}{\sqrt{2}}$$

$$\frac{1}{\sqrt{2}} : \frac{\sqrt{3}}{2}$$

BOARD OF STUDIES
NEW SOUTH WALES

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

$= \frac{1}{3} \sin 3x + C$

ii) $\int_0^1 (e^{5x} - 1) \, dx$

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

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

$= 28.68263182 - \frac{1}{5}$

$= 28.48263182$

$\doteq 28.49$ (to 2 d.p.)