(0,1)

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

$\frac{dy}{dx} = 2e^{2x}$

sub $x=0$ $\quad 2e^0$

$m = 2$

$y - y_1 = m(x - x_1)$

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

$y - 1 = 2x$

$y = 2x + 1$

b) i) $x \sin x$

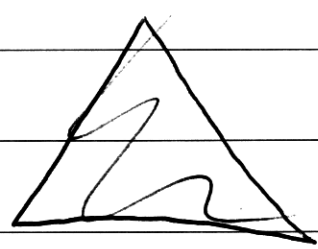
$\frac{dy}{dx} = x^2 \cos x$

ii) $\frac{\ln x}{x^2}$ $\quad \frac{v\frac{du}{dx} + u\frac{dv}{dx}}{v^2}$

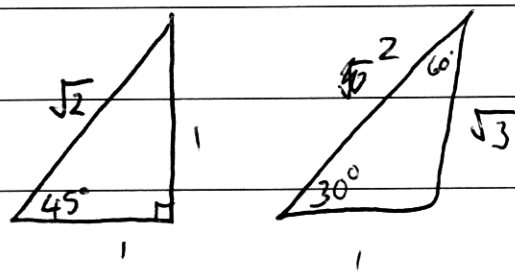
$\frac{x^2 \times \frac{1}{x} \times 1}{x^4} + \frac{\ln x \times 2x}{x^4}$

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

c)



c)



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

d) i) $\int \cos 3x = \frac{1}{3}\cancel{\cos 3}$

$$= -\frac{1}{3}\sin 3x$$

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

$$= \int_0^1 \left(\frac{1}{5}e^{5x}\right)$$

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

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

$$= \frac{1}{5}e^{4}$$