Ques 2

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

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

when $x=0$ $\dfrac{dy}{dx} = 2$

∴ using $y - y_1 = m(x - x_1)$

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

$y - 1 = 2x$

$2x - y + 1 = 0$

b)(i) $x \sin x$

$\dfrac{dy}{dx} = \sin x (1) + x(\cos x)$

$= \sin x + x \cos x$

(ii)

$\dfrac{\ln x}{x^2}$

$\dfrac{dy}{dx} = \dfrac{x^2\left(\ln \frac{1}{x}\right) - \ln x (2x)}{x^4}$

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

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

(c) $\therefore \angle 2 = 180 - 60 - 45$

$\qquad \therefore = 75°$

(d)(1) $\int \cos 3x \, dx$

$= \dfrac{1}{3} \sin 3x$

(ii)

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

$= \displaystyle\int_0^1 \dfrac{\cancel{0}\left(e^{5x}-1\right)^2}{2 \times 5e^{5x}} \, \cancel{dx}$

$= \left[\dfrac{\left(e^{5x}-1\right)^2}{10e^{5x}}\right]_0^1$

$= 8.1807 \times 10^{-3}$

$= \cancel{0.00000082} - 0$

$= \cancel{0.00000082} \quad$ or $\quad \dfrac{\left(e^5 - 1\right)^2}{10e^{5x}}$