$2y = -2x^2 - 7x + 2$
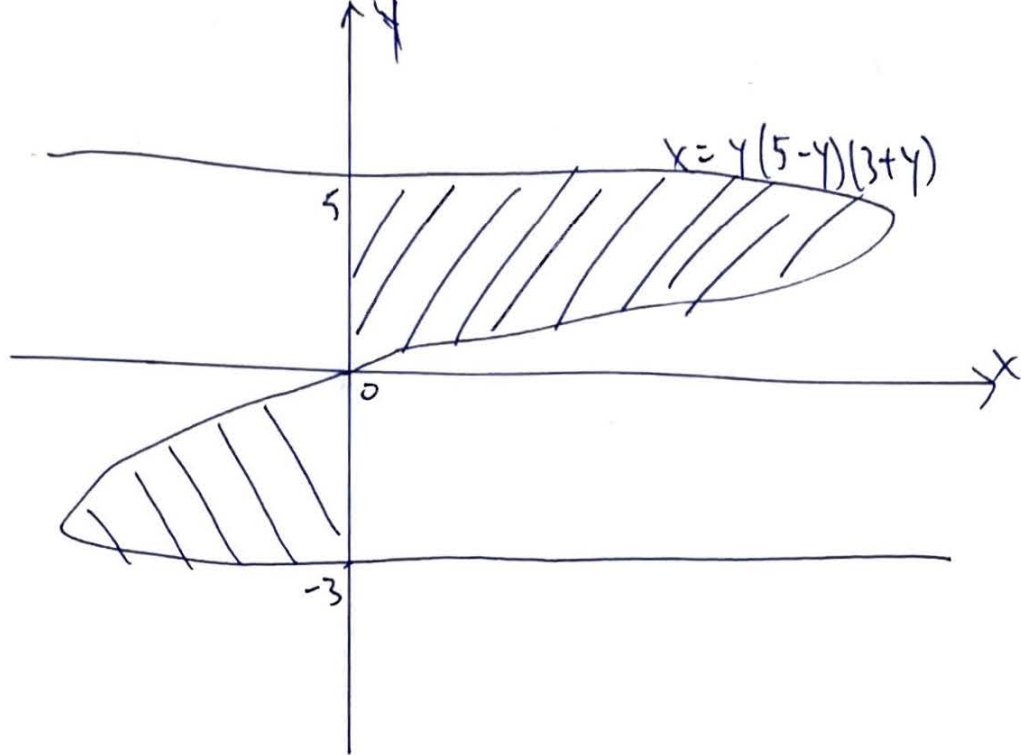

$x = -3.5$

Area:
$$\int_{-3.5}^{0} \frac{-2x^2 - 7x + 2}{2} \, dx$$

$$= \int_{-3.5}^{0} (-x^2 - 3.5x + 1) \, dx$$

$$= \left[-\frac{x^3}{3} - 3.5\frac{x^2}{2} + x \right]_{-3.5}^{0}$$

$$= \left[(0) - \left(-\frac{511}{48} \right) \right] = \frac{511}{48}$$

(2.)

$x = y(5-y)(3+y)$

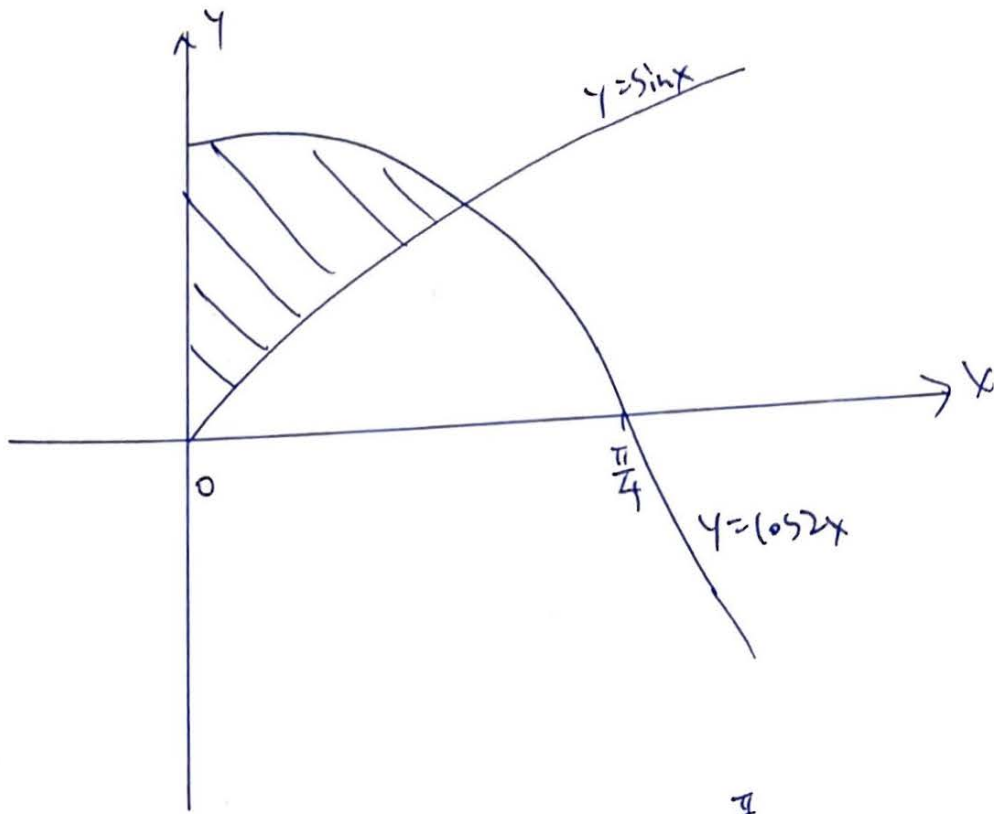Area: $-\int_{-3}^{0} y(5-y)(3+y)dy + \int_{0}^{5} y(5-y)(3+y)dy$

$= -\int_{-3}^{0} (15y+2y^2-y^3)dy + \int_{0}^{5} (15y+2y^2-y^3)dy$

$= -\left[\dfrac{15y^2}{2}+\dfrac{2y^3}{3}-\dfrac{y^4}{4}\right]_{-3}^{0} + \left[\dfrac{15y^2}{2}+\dfrac{2y^3}{3}-\dfrac{y^4}{4}\right]_{0}^{5}$

$= -\left[(0)-\left(\dfrac{135}{2}-18-\dfrac{81}{4}\right)\right] + \left[\left(\dfrac{375}{2}+\dfrac{250}{3}-\dfrac{625}{4}\right)-(0)\right]$

$= \dfrac{863}{6}$ ◁

(3)

$$\begin{cases} y = \sin x \\ y = \cos 2x \end{cases}$$

$\sin x = \cos 2x$

$\sin x = 1 - 2\sin^2 x$

$2\sin^2 x + \sin x - 1 = 0$

$(2\sin x - 1)(\sin x + 1) = 0$

$\therefore \sin x = \frac{1}{2}$ or $\sin x = -1$

$x = \frac{\pi}{6}$ $x = -\frac{\pi}{2}$

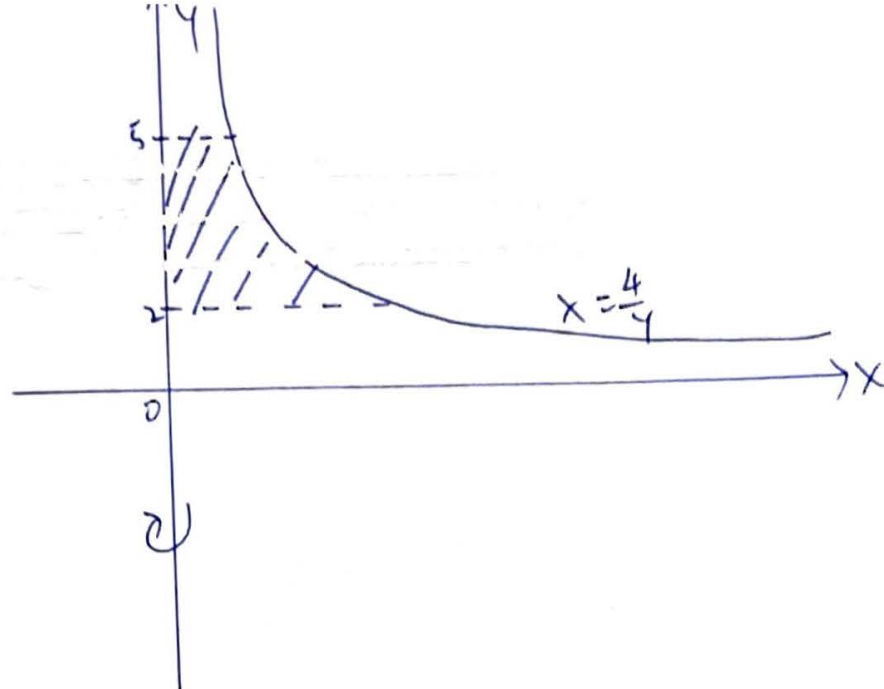Area : $\displaystyle\int_0^{\frac{\pi}{6}} (\cos 2x - \sin x)\,dx$

$= \left[\frac{1}{2}\sin 2x + \cos x \right]_0^{\frac{\pi}{6}}$

$= \left[\left(\frac{1}{2}\cdot\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} \right) - (1) \right]$
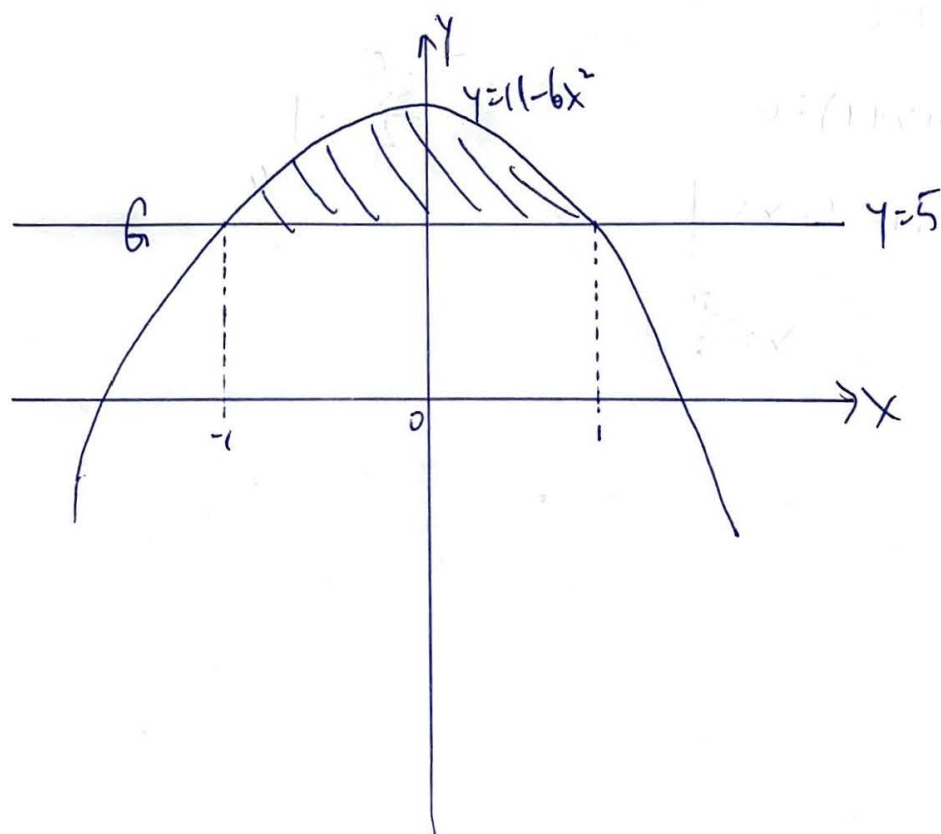
$= \frac{3\sqrt{3}}{4} - 1$

P.3

(1)

Area: $\displaystyle\int_{2}^{5} \frac{4}{y}\,dy$

$$= 4\left[\ln y\right]_{2}^{5}$$

$$= 4\left[\ln 5 - \ln 2\right]$$

$$= 4\ln 2.5 \text{ //}$$
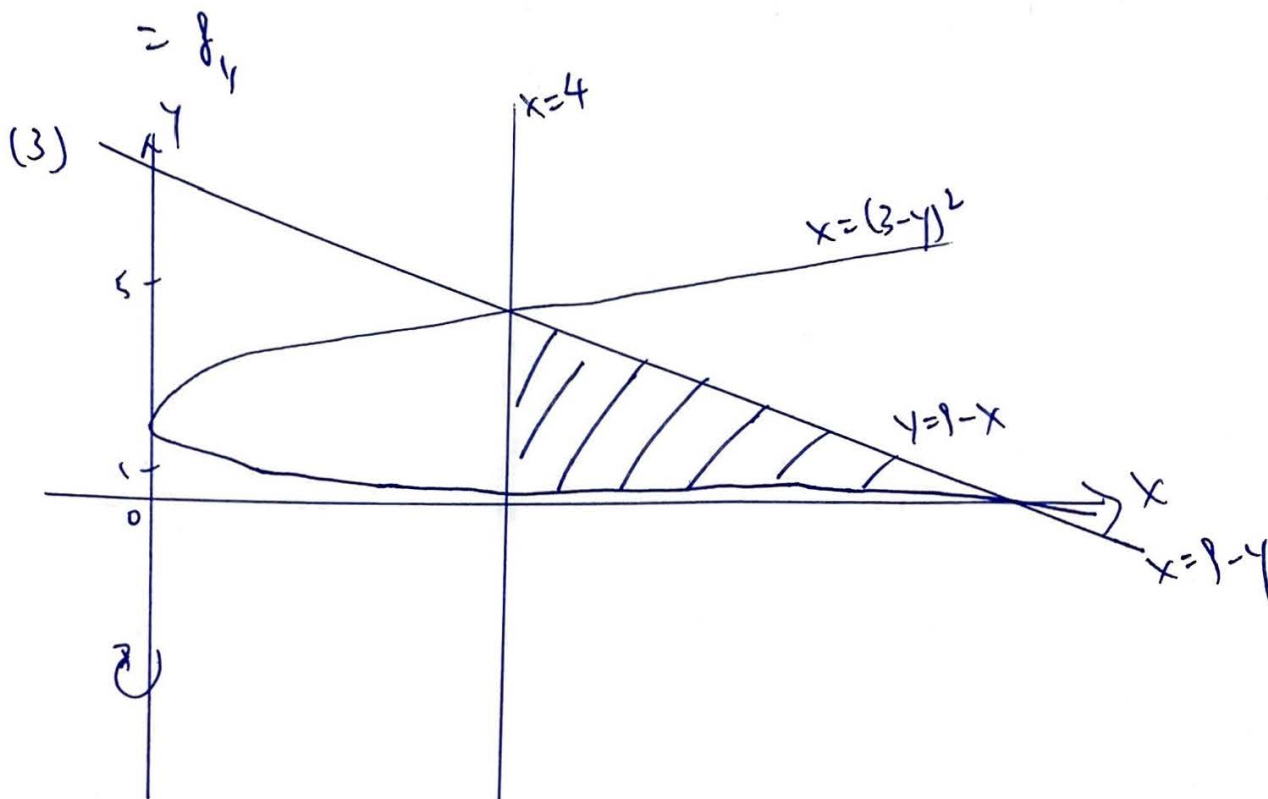
(2)

$y = 11 - 6x^2$

$y = 5$

Area: $\int_{-1}^{1} (11 - 6x^2 - 5)\,dx$

$= 6\int_{-1}^{1} (1 - x^2)\,dx$

$= 6\left[x - \frac{x^3}{3}\right]_{-1}^{1}$

$= 6\left[\left(1 - \frac{1}{3}\right) - \left(-1 + \frac{1}{3}\right)\right]$

$= 8\,\text{y}$

(3)

$x = 4, \quad x = (3 - y)^2$

$4 = (3 - y)^2$

$\therefore \ 3 - y = 2 \quad \text{or} \quad 3 - y = -2$

$\quad\quad y = 1 \quad\quad\quad\quad\quad y = 5$

Area:
$$\int_0^1 \left(9-y-(3-y)^2\right)dy + \int_1^5 (9-y-4)\,dy$$

$$= \int_0^1 (5y-y^2)\,dy + \int_1^5 (5-y)\,dy$$

$$= \left[\frac{5y^2}{2} - \frac{y^3}{3}\right]_0^1 + \left[5y - \frac{y^2}{2}\right]_1^5$$

$$= \left[\left(\frac{5}{2} - \frac{1}{3}\right) - (0)\right] + \left[\left(25 - \frac{25}{2}\right) - \left(5 - \frac{1}{2}\right)\right]$$

$$= \frac{61}{6}$$