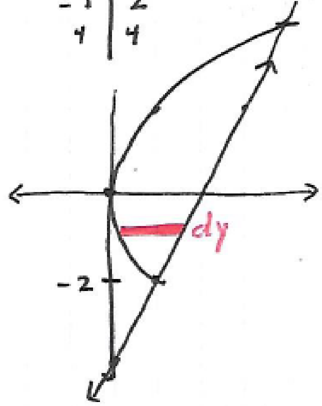
1) $y^2 = 4x \quad y = 2x - 4$

x	y
0	0
± 1	2
4	4



$\frac{1}{4}y^2 = x$

$y + 4 = 2x$

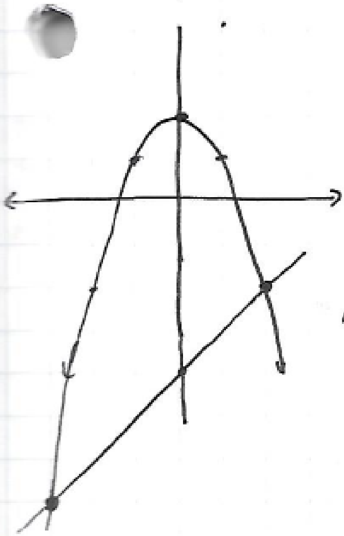
$\frac{1}{2}y + 2 = x$

$$\text{Area} = \int_{-2}^{4} \left[\frac{1}{2}y + 2 - \frac{1}{4}y^2\right] dy$$

$$= \left[\frac{1}{4}y^2 + 2y - \frac{1}{12}y^3\right]\Big|_{-2}^{4}$$

$$= \left[4 + 8 - \frac{64}{12}\right] - \left[1 - 4 + \frac{8}{12}\right]$$

2) $y = 2 - x^2 \quad y = x - 4$



$2 - x^2 = x - 4$

$-x^2 - x + 6 = 0$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3 \quad x = 2$

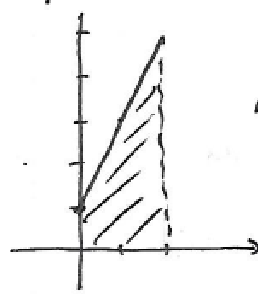
$$\text{Area} = \int_{-3}^{2} \left[2 - x^2 - (x - 4)\right] dx$$

$$= \int_{-3}^{2} \left[-x^2 - x + 6\right] dx$$

$$= \left[-\frac{1}{3}x^3 - \frac{1}{2}x^2 + 6x + C\right]\Big|_{-3}^{2}$$

$$= \left[-\frac{8}{3} - 2 + 12\right] - \left[9 - \frac{9}{2} - 18\right]$$

3) $y = 2x + 1$ on $[0, 2]$



$$\text{Area} = \int_{0}^{2} \left[2x + 1\right] dx$$

$$= \left[x^2 + x + C\right]\Big|_{0}^{2}$$

$$= [4 + 2]$$

$$= \boxed{6}$$

4) $\frac{1}{3}\int_{-1}^{2}[5x^4+3x^2]\,dx$

$\frac{1}{3}\left[x^5+x^3+c\right]\Big|_{-1}^{2}$

$\frac{1}{3}\left[(32+8)-(-1-1)\right]$

$\frac{1}{3}(42) = \boxed{14}$

5) $\frac{1}{\pi}\int_{0}^{\pi}\sin x\,dx$

$\frac{1}{\pi}\left[-\cos x + c\right]\Big|_{0}^{\pi}$

$\frac{1}{\pi}\left[(-\cos \pi)-(-\cos 0)\right]$

$\frac{1}{\pi}\left[1+1\right] = \boxed{\frac{2}{\pi}}$

6) $\frac{1}{2e-e}\int_{e}^{2e}\frac{1}{x}\,dx$

$\frac{1}{e}\left[\ln x + C\right]\Big|_{e}^{2e}$

$\frac{1}{e}\left[\ln 2e - \ln e\right]$

$\frac{1}{e}\left[\ln 2 + \ln e - \ln e\right]$

$\boxed{\frac{\ln 2}{e}}$

7) $\frac{1}{3}\int_{-1}^{2}[3x^2+2x]\,dx$

$\frac{1}{3}\left[x^3+x^2+c\right]\Big|_{-1}^{2}$

$\frac{1}{3}\left[(8+4)-(-1+1)\right] = \boxed{4}$

8) $\frac{1}{1}\int_{0}^{1}\frac{1}{1+x^2}\,dx$

$\left[\arctan x + c\right]\Big|_{0}^{1}$

$\arctan 1 - \arctan 0$

$\boxed{\frac{\pi}{4}}$