5. $y = x^2 \quad y = 2x + 8$

a) PoI's

$x^2 = 2x + 8$

$x^2 - 2x - 8 = 0$

$(x-4)(x+2) = 0$

$x - 4 = 0 \quad x + 2 = 0$

$x = 4 \quad x = -2$

$$\int_{-2}^{4} (\text{ABOVE}) - (\text{BELOW})\, dx$$

$$\int_{-2}^{4} (2x + 8) - (x^2)\, dx$$

$$\int_{-2}^{4} (2x + 8 - x^2)\, dx$$

$$\left[\frac{2x^2}{2} + 8x - \frac{x^3}{3}\right]_{-2}^{4}$$

$$\left[x^2 + 8x - \frac{1}{3}x^3\right]_{-2}^{4}$$

$$\left[4^2 + 8(4) - \frac{1}{3}(4)^3\right] - \left[(-2)^2 + 8(-2) - \frac{1}{3}(-2)^3\right]$$

$$\left[16 + 32 - \frac{64}{3}\right] - \left[4 - 16 + \frac{8}{3}\right]$$

$$\left[48 - \frac{64}{3}\right] - \left[-12 + \frac{8}{3}\right]$$

$$48 - \frac{64}{3} + 12 - \frac{8}{3}$$

$$60 - \frac{72}{3}$$

$$60 - 24$$

$$36$$

b) $y = x^2 \quad y = 2x + 8$

$\pm\sqrt{y} = x \qquad y - 8 = 2x$

$\rightarrow \frac{y-8}{2} = x$

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

PoI's

$\pm\sqrt{y} = \frac{1}{2}y - 4$

$(\pm\sqrt{y})^2 = (\frac{1}{2}y - 4)^2$

$y = (\frac{1}{2}y - 4)(\frac{1}{2}y - 4)$

$y = \frac{1}{4}y^2 - 2y - 2y + 16$

$y = \frac{1}{4}y^2 - 4y + 16$

$4y = 4(\frac{1}{4}y^2) + 4(-4y) + 4(16)$

$4y = y^2 - 16y + 64$

$0 = y^2 - 16y - 4y + 64$

$0 = y^2 - 20y + 64$

$0 = (y-16)(y-4)$

$y - 16 = 0 \quad y - 4 = 0$

$y = 16 \quad y = 4$

$$\int_{0}^{4} (\text{RIGHT}) - (\text{LEFT})\, dy + \int_{4}^{16} (\text{RIGHT}) - (\text{LEFT})\, dy$$

$$\int_{0}^{4} (\sqrt{y}) - (-\sqrt{y})\, dy + \int_{4}^{16} (\sqrt{y}) - (\tfrac{1}{2}y - 4)\, dy$$

$$\int_{0}^{4} (\sqrt{y} + \sqrt{y})\, dy + \int_{4}^{16} (y^{\frac{1}{2}} - \tfrac{1}{2}y + 4)\, dy$$

$$\int_{0}^{4} (2y^{\frac{1}{2}})\, dy + \int_{4}^{16} (y^{\frac{1}{2}} - \tfrac{1}{2}y + 4)\, dy$$