6. $y = x^2 + 6x$, $y = 5x + 6$

POI's

$x^2 + 6x = 5x + 6$

$x^2 + 6x - 5x - 6 = 0$

$x^2 + x - 6 = 0$

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

$x + 3 = 0 \quad x - 2 = 0$

$x = -3 \quad x = 2$

$$\int_{-3}^{2} \underset{A}{(5x+6)} - \underset{B}{(x^2+6x)}\, dx$$

$$= \int_{-3}^{2} (5x + 6 - x^2 - 6x)\, dx$$

$$= \int_{-3}^{2} (-x^2 - x + 6)\, dx \quad *$$

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

$$= \left(-\frac{1}{3}(2)^3 - \frac{1}{2}(2)^2 + 6(2) \right) - \left(-\frac{1}{3}(-3)^3 - \frac{1}{2}(-3)^2 + 6(-3) \right)$$

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

$$= -\frac{8}{3} + 10 - \left(-9 - \frac{9}{2} \right)$$

$$= -\frac{8}{3} + 10 + 9 + \frac{9}{2}$$

$$= 19 - \frac{8}{3} + \frac{9}{2}$$

$$= 19 - \frac{16}{6} + \frac{27}{6}$$

$$= 19 + \frac{11}{6}$$

$$= \frac{114}{6} + \frac{11}{6}$$

$$= \boxed{\frac{125}{6}}$$