

$$5. \int_{x=0}^{x=2} \int_{y=0}^{y=3} (4x-y) dy dx$$

$$= \int_{x=0}^{x=2} \left[4xy - \frac{1}{2}y^2 \right]_{y=0}^{y=3} dx$$

$$= \int_{x=0}^{x=2} \left[4x(3) - \frac{1}{2}(3)^2 - \left(4x(0) - \frac{1}{2}(0)^2 \right) \right] dx$$

$$= \int_{x=0}^{x=2} \left[12x - \frac{9}{2} \right] dx$$

$$= \left[12 \cdot \frac{1}{2}x^2 - \frac{9}{2}x \right]_{x=0}^{x=2}$$

$$= \left[6x^2 - \frac{9}{2}x \right]_{x=0}^{x=2}$$

$$= 6(2)^2 - \frac{9}{2}(2) - \left(6(0)^2 - \frac{9}{2}(0) \right)$$

$$= 24 - 9$$

$$= \textcircled{15}$$