

Homework Answers: Evaluating Integrals

Wednesday, March 12, 2014

2:56 PM

$$\textcircled{1} \int_1^6 \int_1^x dy dx$$

$$= \int_1^6 [y]_1^x dx$$

$$= \int_1^6 dx$$

$$= \textcircled{5}$$

(Area of a 5x1
rectangle)

$$(2) \int_0^{\frac{\pi}{2}} \int_0^2 y \cos x \, dy \, dx$$

$$= \int_0^{\frac{\pi}{2}} \frac{\cos x}{2} [y^2]_0^2 \, dx$$

$$= 2 \int_0^{\frac{\pi}{2}} \cos x \, dx$$

$$= 2 [\sin x]_0^{\frac{\pi}{2}}$$

$$= 2 [1 - 0]$$

$$= \textcircled{2}$$

$$(3) \int_{-1}^2 \int_0^1 (1 + 4x^3y) \, dx \, dy$$

$$= \int_{-1}^2 \left[x + x^4 y \right]_{x=0}^{x=1} \, dy$$

$$= \int_1^2 \left[x + x^4 y \right]_{y=0}^{y=1} dy$$

$$= \int_1^2 (1 + y) dy$$

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

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

$$= 4 - \frac{3}{2}$$

$$= \left(\frac{5}{2} \right)$$

$$(4) \int_1^2 \int_x^3 xy \, dy \, dx$$

$$= \int_{-1}^2 \frac{1}{2} x [y^2]_x^3 dx$$

$$= \int_{-1}^2 \frac{1}{2} x [9 - x^2] dx$$

$$= \frac{1}{2} \int_{-1}^2 (9x - x^3) dx$$

$$= \frac{1}{2} \left[\frac{9}{2} x^2 - \frac{1}{4} x^4 \right]_{-1}^2$$

$$= \frac{1}{2} \left[(18 - 4) - \left(\frac{9}{2} - \frac{1}{4} \right) \right]$$

$$= \frac{1}{2} \left[14 - \frac{17}{4} \right]$$

$$= \frac{1}{2} \left[\frac{39}{4} \right]$$

$$= \sum \left[\frac{2}{4} \right]$$

$$= \frac{39}{8}$$