

15.2 homework

1, 5, 9, 13, 15, 19, 23, 27, 31, 35, 39,
45, 49, 51, 55

$$\begin{aligned} \textcircled{1} \int_1^5 \int_0^x (8x-2y) dy dx &= \int_1^5 [8xy - y^2]_0^x dx = \int_1^5 8x^2 - x^2 dx \\ &= \int_1^5 7x^2 dx = \left[\frac{7}{3} x^3 \right]_1^5 = \frac{7}{3} (125-1) = \frac{7(124)}{3} = \boxed{\frac{868}{3}} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \int_0^1 \int_0^{s^2} \cos(s^3) dt ds &= \int_0^1 [\cos(s^3)t]_0^{s^2} ds = \int_0^1 s^2 \cos(s^3) ds \\ &= \frac{1}{3} \sin(s) \Big|_0^1 = \boxed{\frac{1}{3} \sin(1)} \end{aligned}$$

$$\textcircled{9} \iint_D e^{-y^2} dA \quad D = \{(x,y) \mid y \in [0,3] \wedge x \in [0,y]\}$$

$$\int_0^3 \int_0^y e^{-y^2} dx dy = \int_0^3 [e^{-y^2} x]_0^y dy = \int_0^3 y e^{-y^2} dy$$

$$-\frac{1}{2} \int_0^{-9} e^u du = -\frac{1}{2} (e^{-9} - 1) = \boxed{\frac{1}{2} (1 - e^{-9})}$$

$$\begin{aligned} u &= -y^2 \\ du &= -2y dy \\ y dy &= -\frac{1}{2} du \end{aligned}$$

$$\textcircled{13} \iint_D x dA \quad \begin{array}{l} y=x \quad x=y \\ y=0 \\ x=1 \end{array} \quad \text{Type I} \quad D = \{(x,y) \mid x \in [0,1] \wedge y \in [0,x]\}$$

$$\text{Type II} \quad D = \{(x,y) \mid y \in [0,1] \wedge x \in [y,1]\}$$

$$\text{Type I} \quad \int_0^1 \int_0^x x dy dx = \int_0^1 x^2 dx = \left[\frac{1}{3} x^3 \right]_0^1 = \frac{1}{3}$$

$$\text{Type II} \quad \int_0^1 \int_y^1 x dx dy = \int_0^1 \left[\frac{1}{2} x^2 \right]_y^1 dy = \int_0^1 \left(\frac{1}{2} - \frac{1}{2} y^2 \right) dy = \frac{1}{2} \left[y - \frac{1}{3} y^3 \right]_0^1 = \frac{1}{2} \left(\frac{2}{3} \right) = \boxed{\frac{1}{3}}$$