

## 15.1 Homework

9.  $15 - 3x$



$$A = \frac{1}{2} (5)(15)$$

$$V = \frac{1}{2} (5)(15)(5)$$

15.  $\iint_R x^3 dA$   $R = (-4, 4) \times [0, 5]$

From  $-4$  to  $0$  is same as  $0$  to  $4$   
 so they cancel out. So answer is  $0$

21.  $\int_{-3}^8 \int_4^9 1 \cdot dx dy = (8) - (-3) = 11$

$$\int_4^9 11 dy = 11y \Big|_4^9 = 11(9-4) = 55$$

23.  $\int_{-1}^1 \int_0^\pi x^2 \sin y dy dx = \frac{x^3 \sin y}{3} \Big|_0^\pi = \frac{\pi^3}{3} \int_{-1}^1 \sin y dy$

$$\frac{\pi^3}{3} \cdot (\cos(1+1))$$

25.  $\int_2^6 \int_1^4 x^2 dx dy$

$$\frac{x^3}{3} \Big|_1^4 = \frac{(4-1)^3}{3} = 27 = 9$$

$$\int_2^6 9 dy = 9y \Big|_2^6 = 9(6-2) = 36$$

$$31. \int_1^2 \int_0^4 \frac{dy dx}{x+y} = \int_0^4 \ln(x+y) \Big|_1^2 dy = \frac{\ln(4-0+1) - \ln(4+1)}{1}$$

$$33. \int_0^4 \int_0^5 \frac{dy dx}{\sqrt{x+y}} \quad \int_0^5 \frac{dy}{\sqrt{x+y}} \quad \text{Use } u\text{-substitution}$$

I am stuck for this one.

$$35. \int_1^2 \int_1^3 \frac{\ln(xy) dy dx}{y} \quad \int_1^3 \frac{\ln(xy) dy}{y}$$

Then put this into dx and integrate from 1 to 2

$$37. \int_1^3 \int_1^4 \frac{x}{y} dx dy = \int_1^3 \frac{6}{y} dy = 6(\ln 3 - \ln(1))$$

$$41. \int_0^2 \int_0^{\pi/4} e^x \sin y dy dx \quad -e^x \cos y \quad -e^x \cos(\pi/4) \\ -\frac{\sqrt{2}}{2} e^x \\ -\frac{\sqrt{2}}{2} \int_0^2 e^x dx = e^2 = -\frac{\sqrt{2}}{2} e^2$$

15.2 Homework

3.  $D = 0 \leq x \leq 1, 0 \leq y \leq 1-x^2$

$$\int_0^1 \int_0^{1-x^2} xy \, dy \, dx = \frac{xy^2}{2} \Big|_0^{1-x^2} = \frac{1}{2} \int_0^1 x(1-x^2)^2 \, dx = \frac{1}{12}$$

$$\int_0^1 \int_0^{\sqrt{1-y}} xy \, dx \, dy = \frac{1}{12}$$

5.  $\int_0^4 \int_{\frac{x}{2}}^2 x^2 y \, dy \, dx = \int_0^4 x^2 y \Big|_{\frac{x}{2}}^2 = \frac{x^2 y^2}{2} \Big|_{\frac{x}{2}}^2 = \frac{1}{2} \int_0^4 x^2 (4 - \frac{x^2}{4} - 4 + 2x) \, dx = \frac{8}{5}$

6.  $\int_0^4 \int_{x/2}^2 x^2 y \, dy \, dx = \int_0^4 x^2 (4 - \frac{x^2}{4}) \, dx = \frac{256}{15}$

7.  $\int_0^4 \int_x^2 x^2 y \, dy \, dx = \int_x^2 x^2 y \, dy = \frac{x^2 y^2}{2} \Big|_x^2 = \frac{x^2(4-x)^2}{2}$

11.  $\int_1^2 \int_0^{\sqrt{4-x^2}} \frac{y}{x} \, dy \, dx = \frac{1}{2} \int_1^2 \frac{(4-x^2)}{x} \, dx = 2 \ln 2 - \frac{3}{4}$

$$19. \int_0^1 \int_1^{e^{x^2}} x \, dy \, dx = \int_1^{e^2} x \, dy = xy \Big|_1^{e^{x^2}} = x(e^{x^2} - 1)$$

$$\int_0^1 x e^{x^2} - x \, dx = \frac{1}{2} e - 1$$

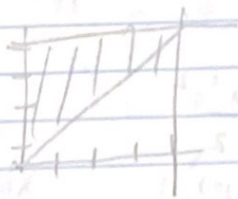
$$21. \int_0^1 \int_{y^2}^y 2xy \, dx \, dy = 2 \int_0^1 \int_{y^2}^y xy \, dx \, dy$$

$$\int_{y^2}^y x^2 y \, dx = \frac{x^2}{2} y \Big|_{y^2}^y = \frac{y}{2} (y^2 - y^4)$$

$$\int_0^1 y^3 - y^5 \, dy = \left. \frac{y^4}{4} - \frac{y^6}{6} \right|_0^1$$

$$= \frac{1}{12}$$

$$25. \int_0^4 \int_x^4 f(x,y) \, dy \, dx$$



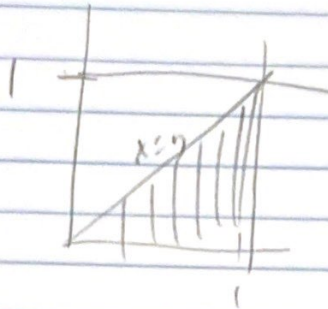
$$31. f(x,y) = (\ln y)^{-1}$$

$$y = e^x$$

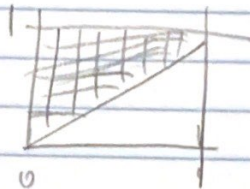
$$x = \ln y$$

I have no idea

33.  $\int_0^1 \int_y^1 \sin x \, dx \, dy$   $0 \leq y \leq 1$

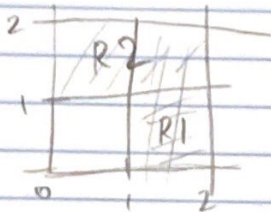


35.  $\int_0^1 \int_{y=x}^1 x e^{y^3} \, dy \, dx$   $0 \leq x \leq 1$



37.  $\int_0^2 \int_1^2 e^{x+y} \, dx \, dy = \int_0^2 \left( \int_1^2 e^{x+y} \, dx \right) dy$

$$\int_0^2 (e^{x+2} - e^{x+1}) \, dx$$



43.  $\int_1^2 \int_{y=x}^2 \frac{\sin y}{y} \, dx \, dy$   $\int_1^2 \sin y \, dy = -\cos(2-1)$

$$e^4 - e^2 - e^2 + e$$

49.  $z = x^2 + y^2$   $z = 8 - x^2 - y^2$   
 Yo. how to we integral (subtract?)

$$\int (x^2 + y^2) - (8 - x^2 - y^2)$$