

# Exercise 14.1

## Assignment 18

Date: \_\_\_\_\_

Q5

$$\int_0^{\ln 3} \int_0^{\ln 2} e^{x+y} dy dx$$

$$\int_0^{\ln 3} \int_0^{\ln 2} e^x \cdot e^y dy dx$$

$$\int_0^{\ln 3} e^x [e^y]_0^{\ln 2} dx$$

$$\int_0^{\ln 3} e^x dx$$

$$[e^x]_0^{\ln 3}$$

$$\boxed{2}$$

Q7

$$\int_{-1}^0 \int_2^5 dx dy$$

$$\int_{-1}^0 [x]_2^5 dy$$

$$3 \int_{-1}^0 dy$$

$$3[y]_{-1}^0$$

$$\boxed{3}$$

Q9

$$\int_0^1 \int_0^1 \frac{x}{(xy+1)^2} dy dx$$

$$\int_0^1 \int_0^1 x(xy+1)^{-2} dy dx$$

$$= \int_0^1 \left[ \frac{-1}{xy+1} \right]_0^1 dx$$

$$= \int_0^1 \frac{1}{x(1)+1} - \frac{1}{x(0)+1} dx$$

$$= \int_0^1 \frac{1}{x+1} - 1 dx$$

$$= \left[ \int_0^1 \frac{1}{x+1} dx - \int_0^1 1 dx \right]$$

$$= \left[ \int_0^1 \frac{1}{x+1} dx - \int_0^1 1 dx \right]$$

$$= \left[ \ln(x+1) - x \right]_0^1$$

$$= 1 - \ln 2$$



Date \_\_\_\_\_

Q15

$$\iint_R x\sqrt{1-x^2} \, dA \quad R = \{(x,y) : 0 \leq x \leq 1, 2 \leq y \leq 3\}$$

$$\int_2^3 \int_0^1 x\sqrt{1-x^2} \, dx \, dy$$

$$-\frac{1}{2} \int_2^3 \int_0^1 -2x\sqrt{1-x^2} \, dx \, dy$$

$$-\frac{1}{2} \int_2^3 \left[ \frac{2(1-x^2)^{3/2}}{3} \right]_0^1 \, dy$$

$$-\frac{1}{2} \int_2^3 \left( \frac{2(0)^{3/2}}{3} - \frac{2(1)^{3/2}}{3} \right) \, dy$$

$$+ \frac{1}{2} \int_2^3 \frac{2}{3} \, dy$$

$$+ \frac{1}{3} [y]_2^3$$

$$\boxed{+\frac{1}{3}}$$

Q 29

$$\int_1^2 \int_3^5 2x + y \, dx \, dy$$

$$\int_1^2 \left( \left[ \frac{2x^2}{2} \right]_3^5 + [xy]_3^5 \right) dy$$

$$\int_1^2 (16 + 2y) \, dy$$

$$[16y]_1^2 + \left[ \frac{2y^2}{2} \right]_1^2$$

$$16 + 3$$

$$\boxed{19}$$

Q 31

$$\int_0^3 \int_0^2 x^2 \, dx \, dy$$

$$\int_0^3 \left[ \frac{x^3}{3} \right]_0^2 \, dy$$

$$\int_0^3 \frac{8}{3} \, dy$$



$$\frac{8}{3} [y]_0^3$$

$$\boxed{8}$$

**Q35**

$$A(R) = (8-0)(6-0) = 48$$

$$\frac{1}{48} \int_0^6 \int_0^8 xy^2 dx dy$$

$$\frac{1}{48} \int_0^6 \frac{y^2}{2} [x^2]_0^8 dy$$

$$\frac{1}{48} 32 \int_0^6 y^2 dy$$

$$\frac{1}{48} \times \frac{32}{3} [y^3]_0^6$$

$$\frac{2304}{48}$$

$$\boxed{48}$$