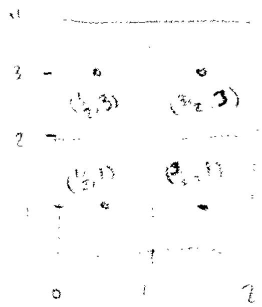
# 272 HW #1

16.1 #4b, 11

16.2 9, 10, 36

**16.1 #4b** $R = [0,2] \times [0,4]$

do $\iint_R x + 2y^2 \, dA$ with midpts, $n = 2$, $m = 2$



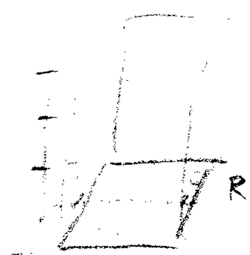

$$V \approx 2\left( \tfrac{1}{2} + 2\cdot 1^2 + \tfrac{3}{2} + 2\cdot 1^2 + \tfrac{1}{2} + 2\cdot 3^2 + \tfrac{3}{2} + 2\cdot 3^2 \right)$$

$$= 2(4 + 2 + 2 + 17 + 13) = 2\cdot 44 = \underline{88}$$

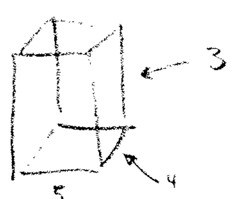
$\Delta A = 2$

**16.1 #11** $\iint_R 3 \, dA$ $R = [-2,2] \times [1,6]$

The volume under 3




volume above R, height 3 is a box:




$V = 5 \cdot 4 \cdot 3 = \underline{60}$

16.2 #9

$$\int_1^4 \int_1^2 \left(\frac{x}{y} + \frac{y}{x}\right) dy\, dx$$

$$= \int_1^4 \int_1^2 xy^{-1} + x^{-1}y \; dy\, dx = \int_1^4 x \ln y + \tfrac{1}{2} x^{-1} y^2 \Big|_{y=1}^{2}$$

$$= \int_1^4 x \cdot \ln 2 + \tfrac{1}{2} x^{-1} \cdot 4 - \left(\cancel{x \overset{\ln 1 = 0}{\ln 1}} + \tfrac{1}{2} x^{-1}\right) \; dx$$

$$= \int_1^4 \ln 2 \cdot x + 2x^{-1} - \tfrac{1}{2} x^{-1} \; dx$$

$$= \frac{\ln 2}{2} x^2 + \frac{3}{2} \ln x \Big|_1^4 = \frac{\ln 2}{2} \cdot 16 + \frac{3}{2} \ln 4 - \left(\frac{\ln 2}{2}\right)$$

$$= 8 \ln 2 + \tfrac{3}{2} \ln 4 - \tfrac{1}{2} \ln 2$$

16.2 #10

$$\int_0^1 \int_0^3 e^{x+3y} \, dx\, dy = \left(\int_0^3 e^x \, dx\right)\left(\int_0^1 e^{3y} \, dy\right)$$

$$= \cancel{(e^3 - e^0)\left(\tfrac{1}{3}(e^3 - e)\right) = (e-1)\left(\tfrac{1}{3} e - \tfrac{1}{3}\right)}$$

$$= (e^3 - e^0)\left(\tfrac{1}{3}(e^3 - e^0)\right) = \tfrac{1}{3}\left(e^6 - 2e^3 + 1\right)$$

16.2 #36

$$\iint_R e^y \sqrt{x+e^y}\, dA \qquad R = [0,4] \times [0,1]$$

$$\int_0^4 \int_0^1 e^y \sqrt{x+e^y}\, dy\, dx \overset{\substack{u = x+e^y \\ du = e^y dy}}{=} \int_0^4 \frac{3}{2}(x+e^y)^{3/2} \Big|_{y=0}^{1} dx$$

$$= \frac{3}{2}\int_0^4 (x+e)^{3/2} - (x+1)^{3/2}\, dx$$

$$= \frac{3}{2}\left( \frac{2}{5}(x+e)^{5/2} - \frac{2}{5}(x+1)^{5/2} \right)\Big|_0^4$$

$$= \frac{3}{5}(4+e)^{5/2} - \frac{3}{5}(5)^{5/2} - \left( \frac{3}{5} e^{5/2} - \frac{2}{5} \right)$$