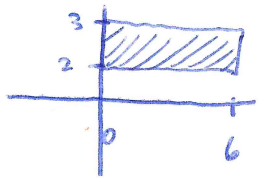


① Region

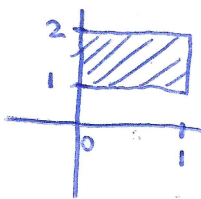
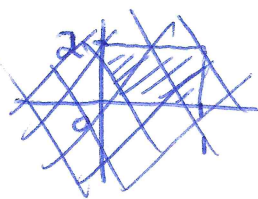


$$\int_2^3 \int_0^6 x^2 y \, dx \, dy = \int_2^3 198y \, dy$$

$$= \frac{x^3}{3} y \Big|_0^6 = \frac{198}{2} y^2 \Big|_2^3$$

$$= 99[9-4] = 5(99) = 495$$

② Region

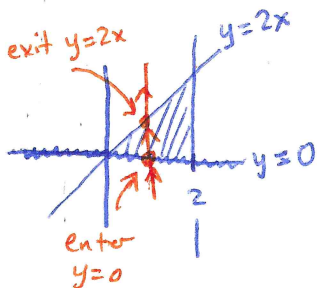


$$\int_0^1 \int_1^2 \frac{e^x}{y} \, dy \, dx = \int_0^1 \ln(2) e^x \, dx$$

$$= e^x \ln(y) \Big|_1^2 = \ln(2) e^x \Big|_0^1$$

$$= e^x (\ln(2) - \ln(1)) = \ln(2)(e-1)$$

③ Region



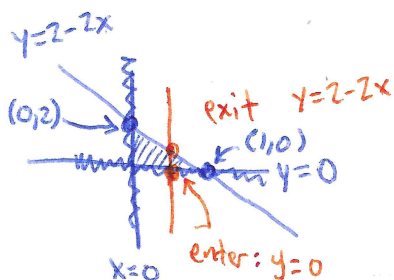
Do integral as $dydx$?

$$\iint_R x^3 y^2 \, dA = \int_0^2 \int_0^{2x} x^3 y^2 \, dy \, dx = \int_0^2 \frac{8x^6}{3} \, dx$$

$$= \frac{x^3 y^3}{3} \Big|_{y=0}^{y=2x} = \frac{8}{21} x^7 \Big|_0^2$$

$$= \frac{8x^3(8x^3)}{3} - 0 = 2^7 \left(\frac{8}{21}\right) = \frac{1024}{21}$$

④ Region



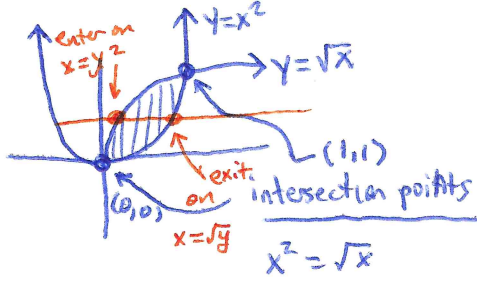
Do as $dydx$:

$$\iint_R e^{xy} \, dA = \int_0^1 \int_0^{2-2x} e^{xy} \, dy \, dx = \int_0^1 \frac{1}{x} e^{-2x^2+2x} \, dx$$

$$= \frac{1}{x} e^{xy} \Big|_{y=0}^{y=2-2x} = \frac{1}{x} (e^{x(2-2x)} - 1)$$

cannot proceed

5)



square
 $x^4=x$
 $x(x^3-1)=0$
 $x=0$ $x^3-1=0$
 $\rightarrow x^3=1$
 $\rightarrow x=1$

Do as dx dy

$$\iint_R x^2+y \, dA = \int_0^1 \int_{y^2}^{\sqrt{y}} x^2+y \, dx \, dy$$

$$= \left. \frac{x^3}{3} + xy \right|_{x=y^2}^{x=\sqrt{y}}$$

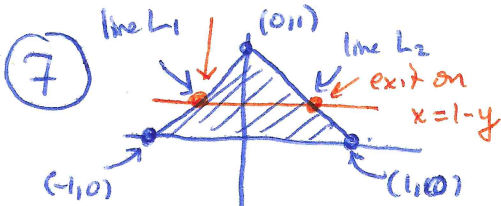
$$= \left(\frac{y^{3/2}}{3} + y^{3/2} \right) - \left(\frac{y^6}{3} + y^3 \right)$$

$$= \int_0^1 \left(\frac{4}{3} y^{3/2} - \frac{1}{3} y^6 - y^3 \right) dy$$

$$= \left. \frac{4}{3} \cdot \frac{2}{5} y^{5/2} - \frac{1}{21} y^7 - \frac{1}{4} y^4 \right|_0^1$$

$$= \frac{8}{15} - \frac{1}{21} - \frac{1}{4}$$

enter on $x=y-1$



Equation for L1
 slope = $\frac{1-0}{0-(-1)} = 1$
 eq: $y-0 = x - (-1)$
 $y = x+1$ $x=y-1$

Equation for L2
 slope = $\frac{0-1}{1-0} = -1$
 eq: $y-0 = (-1)(x-1)$
 $y = -x+1$
 $x=1-y$

Do as dx dy

$$\int_0^1 \int_{y-1}^{1-y} e^x y \, dx \, dy$$

$$= \left. e^x y \right|_{x=y-1}^{x=1-y}$$

$$= \frac{1-y}{y} e^{1-y} - \frac{y-1}{y} e^{y-1}$$

$$= \int_0^1 \left(\frac{1-y}{y} e^{1-y} - \frac{y-1}{y} e^{y-1} \right) dy$$

cannot integrate easily
 would require two integrations
 by parts!