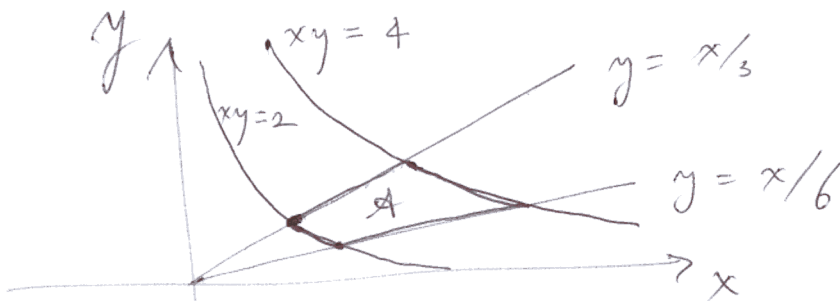


Name \_\_\_\_\_

5. (10 pts.) Find the area of the region in the  $xy$ -plane bounded by the four curves  $xy = 2$ ,  $xy = 4$ ,  $x/y = 3$ , and  $x/y = 6$ .

area = log 2

$$u = xy$$

$$v = x/y$$

$$x = \sqrt{uv}$$

$$y = \sqrt{\frac{u}{v}}$$

$$\frac{\partial(x,y)}{\partial(u,v)} = \begin{bmatrix} \frac{1}{2}u^{-\frac{1}{2}}v^{\frac{1}{2}} & \frac{1}{2}u^{\frac{1}{2}}v^{-\frac{1}{2}} \\ \frac{1}{2}u^{-\frac{1}{2}}v^{-\frac{3}{2}} & -\frac{1}{2}u^{\frac{1}{2}}v^{-\frac{3}{2}} \end{bmatrix}$$

$$= -\frac{1}{4}(v^{-1} + v^{-1}) = -\frac{1}{2v}$$

$$\int_A dx dy = \int_3^6 \int_2^4 \left| \frac{\partial(x,y)}{\partial(u,v)} \right| du dv$$

$$= \int_3^6 \int_2^4 \frac{du dv}{2v} = \log v \Big|_3^6 = \log 2.$$