

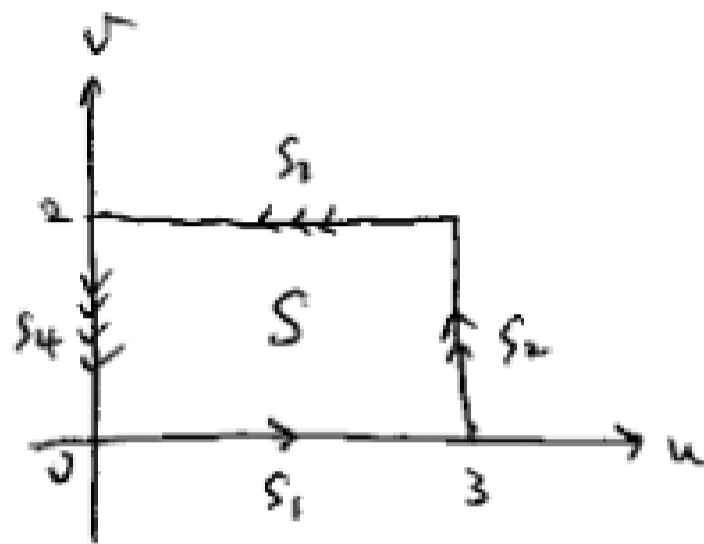
MATH 2339, HW 38: Solution

§12.8

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(4)

$$S = \{(u, v) \mid 0 \leq u \leq 3, 0 \leq v \leq 2\}; \quad x = 2u + 3v, \quad y = u - v$$

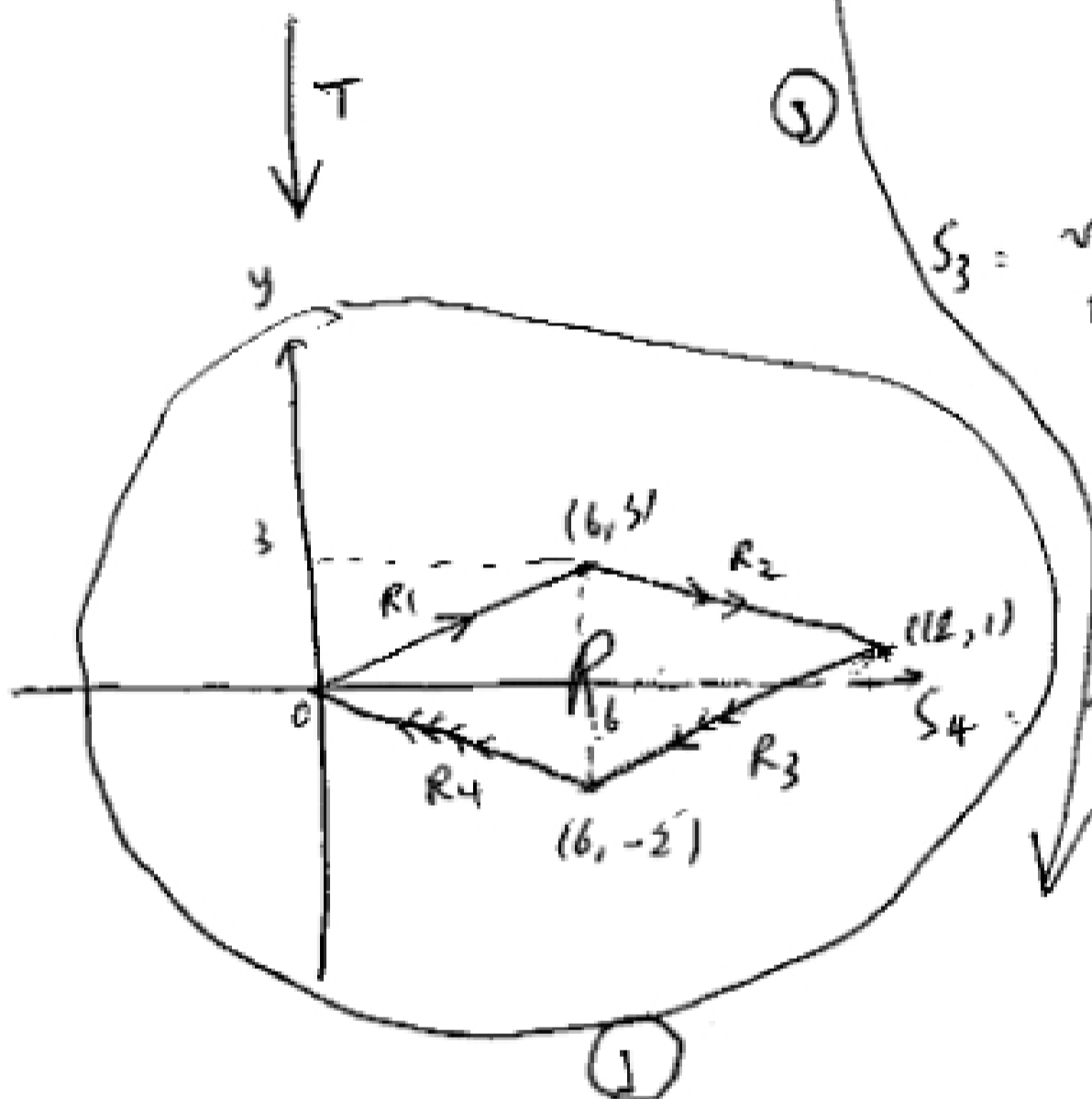


$$S_1: \begin{cases} v=0 \\ u=0 \rightarrow 3 \end{cases} \rightarrow R_1: \begin{cases} x=2u+3v=2u \\ y=u-v=u \end{cases} \Rightarrow x=2y, \quad y=u=0 \rightarrow 3$$

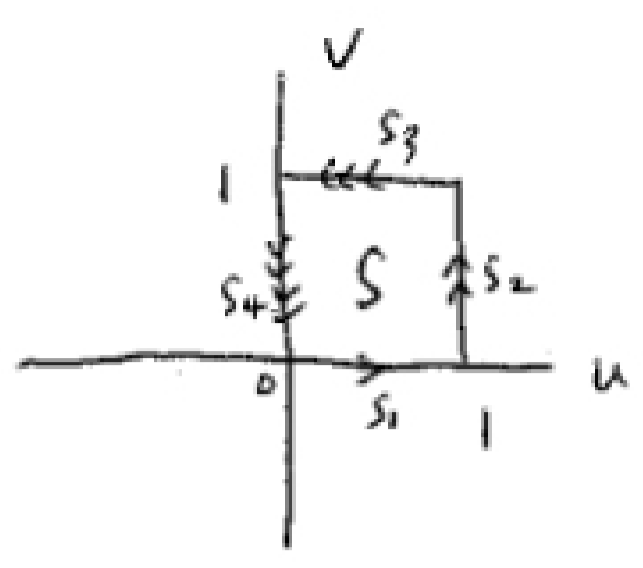
$$S_2: \begin{cases} u=3 \\ v=0 \rightarrow 2 \end{cases} \rightarrow R_2: \begin{cases} x=6+3v \\ y=3-v \end{cases} \Rightarrow \begin{cases} x=6+9-3y \\ =15-3y \end{cases} \\ y=3-v=3 \rightarrow 1$$

$$S_3: \begin{cases} v=2 \\ u=3 \rightarrow 0 \end{cases} \rightarrow R_3: \begin{cases} x=2u+6 \\ y=u-2 \end{cases} \Rightarrow \begin{cases} x=2y+4+6 \\ =2y+10 \end{cases} \\ y=u-2=3 \rightarrow -2$$

$$S_4: \begin{cases} u=0 \\ v=2 \rightarrow 0 \end{cases} \rightarrow R_4: \begin{cases} x=3v \\ y=-v \end{cases} \Rightarrow \begin{cases} x=-3y \\ y=-v=-2 \rightarrow 0 \end{cases}$$



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$$x = u$$

$$y = u(1 + v^2)$$

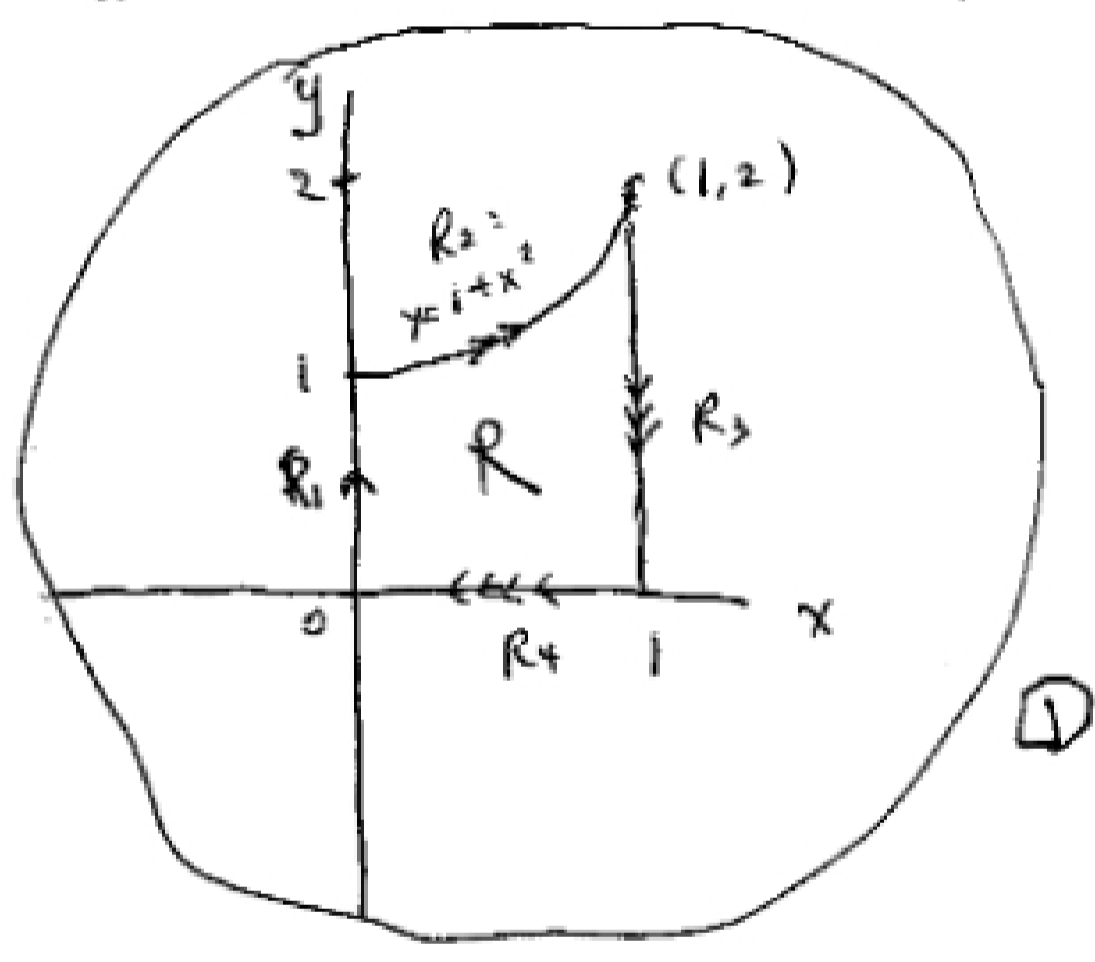
$$S_1: \begin{cases} u=0 \rightarrow 1 \\ v=0 \end{cases} \rightarrow R_1: \begin{cases} x=0 \\ y=u=0 \rightarrow 1 \end{cases}$$

$$S_2: \begin{cases} u=1 \\ v=0 \rightarrow 1 \end{cases} \rightarrow R_2: \begin{cases} x=v=0 \rightarrow 1 \\ y=1+v^2=1+x^2 \end{cases}$$

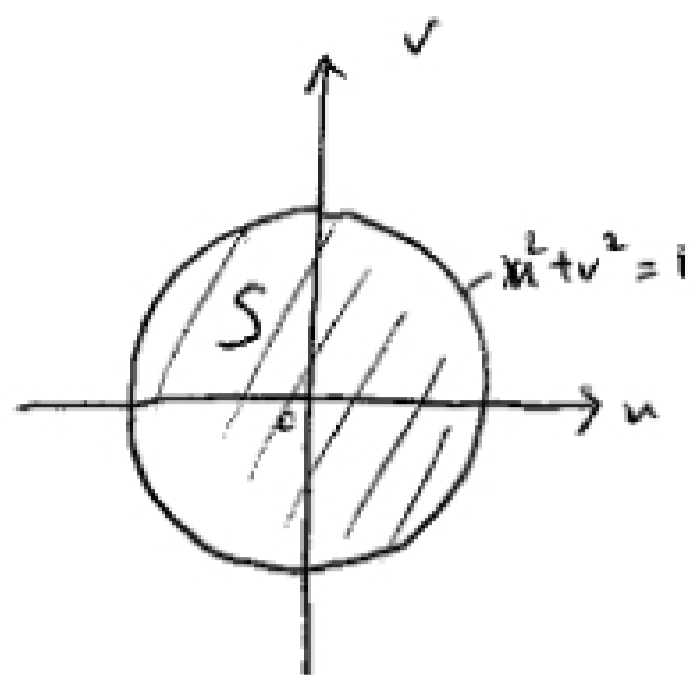
$$S_3: \begin{cases} v=1 \\ u=1 \rightarrow 0 \end{cases} \rightarrow R_3: \begin{cases} x=1 \\ y=2u=2 \rightarrow 0 \end{cases}$$

$$S_4: \begin{cases} v=1 \rightarrow 0 \\ u=0 \end{cases} \rightarrow R_4: \begin{cases} x=v=1 \rightarrow 0 \\ y=0 \end{cases}$$

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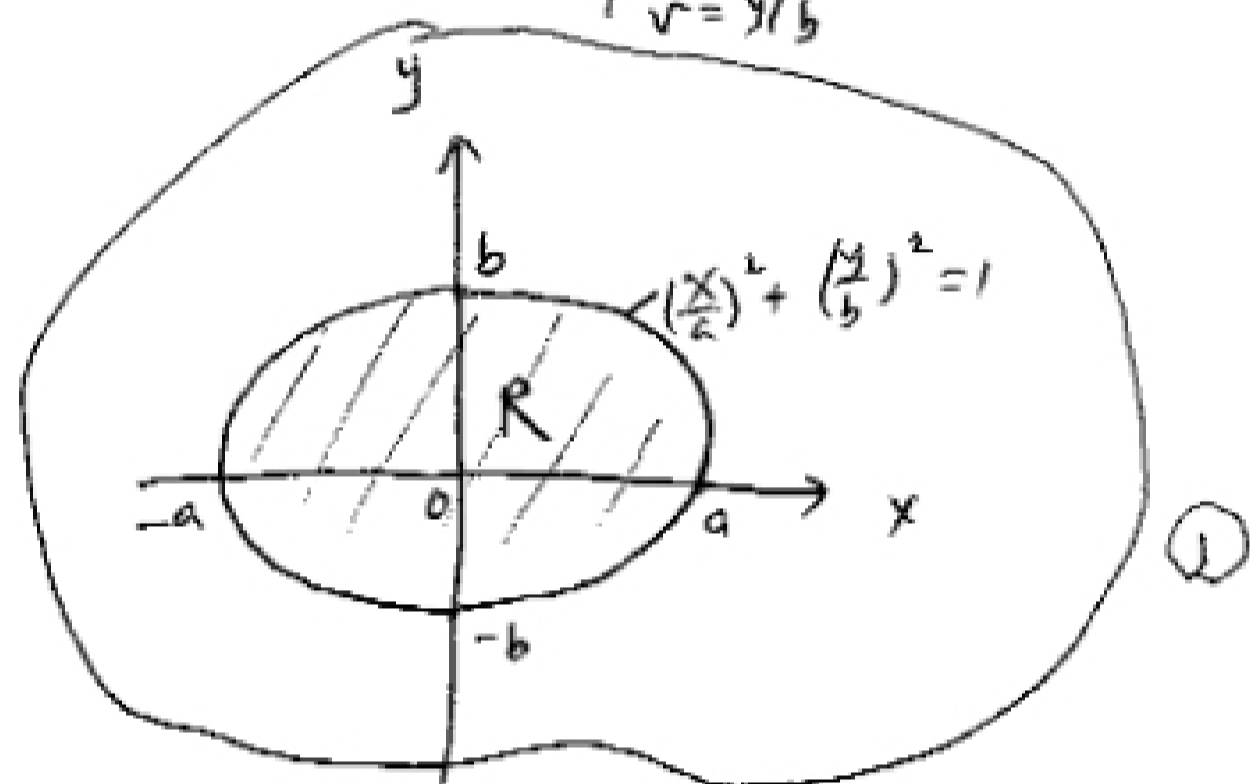
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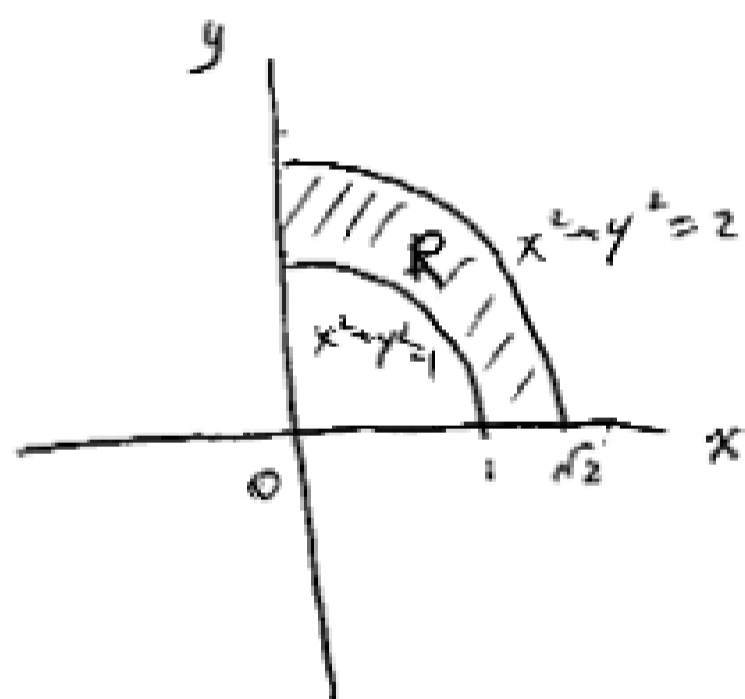
$$\begin{aligned} x &= au \\ y &= bv \end{aligned}$$

$$u^2 + v^2 \leq 1 \quad \begin{cases} x = au \\ y = bv \end{cases} \rightarrow \left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 \leq 1$$

$$\begin{cases} u = x/a \\ v = y/b \end{cases}$$



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$$\begin{aligned} T^{-1}: & \begin{cases} r = \sqrt{x^2 + y^2} \\ \tan \theta = y/x \end{cases} \\ T: & \begin{cases} x = r \cos \theta \\ y = r \sin \theta \end{cases} \end{aligned}$$

