

# Calculus 1

Show that the set is Unbounded

$$S = \left\{ \frac{3-x}{1-x} \ ; \ x > 0 \ x \neq 1 \right\}$$

$$y = \frac{3-x}{1-x} \quad x > 0, \ x \neq 1$$

$$y(1-x) = 3-x$$

$$y - yx = 3 - x$$

$$-yx + x = 3 - y$$

$$x(1-y) = 3-y$$

$$x = \frac{3-y}{1-y} > 0 \quad - \textcircled{1}$$

Case I -

$$1-y > 0$$

$$-y > -1$$

$$y < 1$$

from  $\textcircled{1}$

$$1-y > 0.$$

$$\Rightarrow 3-y > 0$$

$$-y > -3$$

$$y < 3.$$

$$\Rightarrow y = (-\infty, 1) \quad - \textcircled{II}$$

Case II

$$1 - y < 0$$

$$-y < -1$$

$$y > 1.$$

from ①

$$\frac{3-y}{1-y} > 0$$

$$\Rightarrow 3 - y < 0$$

$$-y < -3$$

$$y > 3.$$

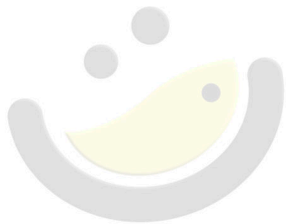
$$y = (3, \infty) \quad - \textcircled{111}$$

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from (i) and (ii)

$$y = (-\infty, 1) \cup (3, \infty)$$

$\Rightarrow S$  is unbounded.



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