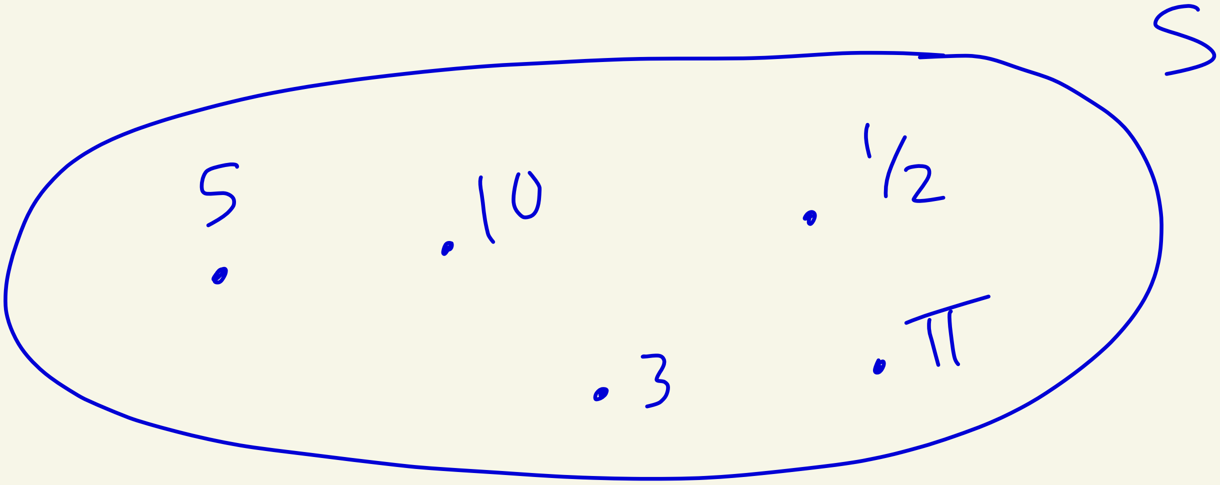
2550

HW 0

Solutions

① $S = \{5, 3, 10, \frac{1}{2}, \pi\}$



(a) $10 \in S$

True. 10 is an element of S.

(b) $\frac{3}{2} \in S$

False. $\frac{3}{2}$ is not an element of S.
The true statement would be $\frac{3}{2} \notin S$

(c) $3 \notin S$

False. 3 is an element of S.
The true statement would be $3 \in S$.

(2)

$$A = \{1, 2, 3, -10, -1, -2\}$$

$$S = \{t^2 \mid t \in A\}$$

$$= \{(1)^2, (2)^2, (3)^2, (-10)^2, (-1)^2, (-2)^2\}$$

$$= \{1, 4, 9, 100, 1, 4\}$$

$$= \{1, 4, 9, 100\}$$

sets don't have duplicates so we only put 1 & 4 once in the set

(3)

$S = \{ t \mid t^2 + t - 1 = 0 \text{ where } t \text{ is a real number} \}$

S consists of all real numbers t that solve the equation $t^2 + t - 1 = 0$.

The solutions of $t^2 + t - 1 = 0$ are $t = \dfrac{-1 \pm \sqrt{(1)^2 - 4(1)(-1)}}{2(1)} = \dfrac{-1 \pm \sqrt{5}}{2}$

So,

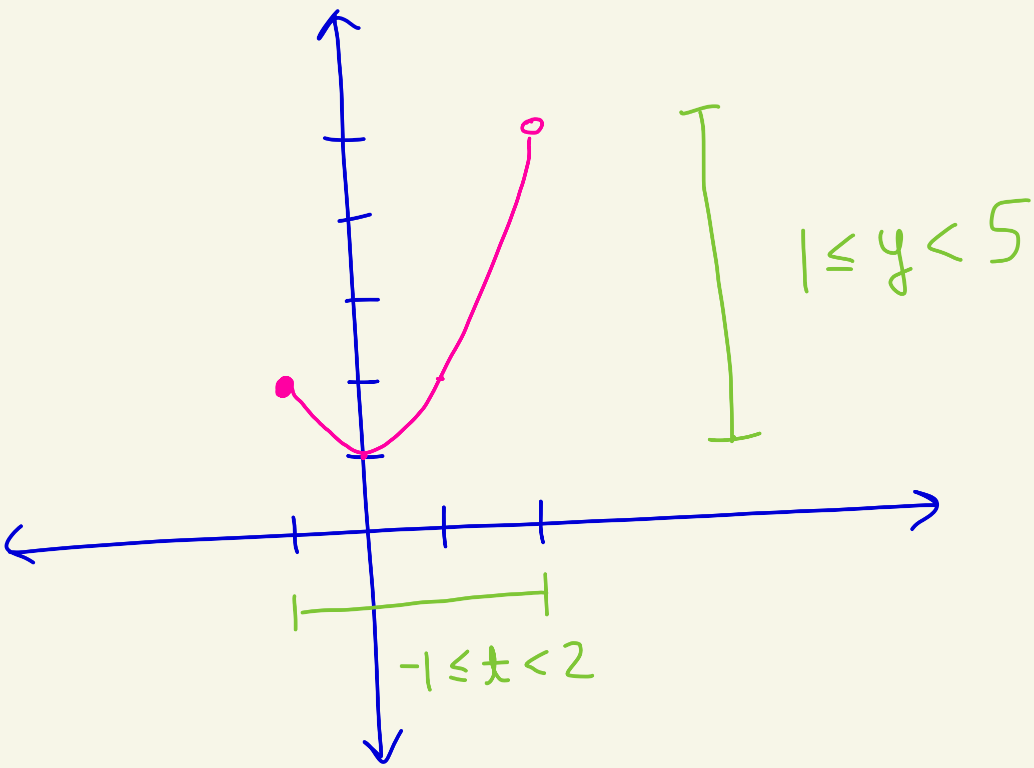
$$S = \left\{ \frac{-1+\sqrt{5}}{2}, \frac{-1-\sqrt{5}}{2} \right\}$$

S consists of two elements.

④

$S = \{ t^2+1 \mid -1 \leq t \leq 2 \text{ where } t \in \mathbb{R} \}$

Let $y = t^2+1$



When $-1 \leq t < 2$, the expression t^2+1 ranges over the interval $[1, 5)$.

So, $S = [1, 5)$