▷. As covered in §2.3 Handout (book p. 58), set builder notation (with universe U) is of the form

$$\{x \in U : P(x)\}. \qquad \text{(Set Builder Notation)}$$

Set builder notation defines/builds a set. First say where an arbitrary element/variable "lives" (here, x is/lives in U). Second state the property/rule/restriction that the element must satify in order to be in the set (which is an an open sentence in the variable, here $P(x)$). An example:

$$\underbrace{\{k \in \mathbb{N} : k = n^2 \text{ for some } n \in \mathbb{N}\}}_{\text{set builder notation}} = \underbrace{\{n^2 \in \mathbb{N} : n \in \mathbb{N}\}}_{\substack{\text{set notation but NOT set builder notation} \\ \text{book calls } \textit{modified} \text{ set builder notation}}} = \underbrace{\{1, 4, 9, 16, 25, 36, \ldots\}}_{\text{roster method}}.$$

Note that the book use "set builder notation" and "modified set builder notation" interchageable; however, so that you do will in the 500-level class we will differentiate between the two forms.

On Homework and Exam, when asked for set builder notation, modified set bulider notation will NOT be accepted!

►. Express the given sets in/using the form indicated. If a universe is needed, use: $\mathbb{N}$, $\mathbb{Q}$, $\mathbb{R}$, or $\mathbb{Z}$.

Hints. Sets S_1 and S_2 are given in set builder notation. Sets S_3 and S_4 are given using the roster method.

Note that Set S_5 cannot be expressed using the roster method.

1. Write the set $S_1 = \{x \in \mathbb{N} : -2 < x \leq 7\}$ using the Roster Method.
2. Write the set $S_2 = \{x \in \mathbb{Z} : |2x| < 5\}$ using the Roster Method.
3. Write the set $S_3 = \left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6} \ldots\right\}$ in set builder notation.
4. Write the set $S_4 = \{3, 6, 9, 12, 15, 18, 21, \ldots\}$ in set builder notation.
5. Write the set $S_5 = [8, 17]$, i.e. the closed interval of real numbers from 8 to 17, in set builder notation.

. . . . . .