

HOMEWORK 17
MATH 3345 – SPRING 2022 – KUTLER

Please complete the following problems on your own paper. Solutions should be written clearly, legibly, and with appropriate style.

1. **[Falkner Section 10 Exercise 1]** Which of the sets A , B , C , D , and E below are the same?

$$A = \{3\}, \quad B = \{2, 4\}, \quad C = \{x \mid x \text{ is prime, } x \text{ is odd, and } x < 5\},$$
$$D = \{x - 1 \mid x \text{ is prime, } x \text{ is odd, and } x < 5\}, \quad E = \{x^2 + x \mid x \in \{-1, 1\}\}.$$

Also, how many distinct sets are named here?

2. **[Falkner Section 10 Exercise 5]** Let A be a set such that for each set B , we have $A \subseteq B$. Show that $A = \emptyset$.
3. **[Falkner Section 10 Exercise 6]**
- (a) Find a set A and a set B such that $A \notin B$ and $A \not\subseteq B$.
 - (b) Find a set A and a set B such that $A \in B$ and $A \subseteq B$.

Practice Problems

It is strongly recommended that you complete the following problems. There is no need to write up polished, final versions of your solutions (although you may find this a useful exercise). Please do not submit any work for these problems.

1. **[Falkner Section 10 Exercise 3]** Use set-builder notation to describe the sets

$$A = \{\{1\}, \{2\}, \{3\}, \dots\}$$

and

$$B = \{\{1, 2, 3, \dots\}, \{2, 4, 6, \dots\}, \{3, 6, 9, \dots\}, \dots\}.$$

(Of course, you will need to make reasonable assumptions about the patterns in these examples.)

2. **[Falkner Section 10 Exercise 4]** Which of the following set notations denote the empty set?
- (a) $\{z \mid z \text{ is a horse and } z \text{ has 6 legs}\}.$
 - (b) $\{a \in \mathbb{R} \mid a^2 + 2a + 2 = 0\}.$
 - (c) $\{n \in \mathbb{N} \mid n^2 + n + 11 \text{ is not prime}\}.$