A farmer uses two types of fertilizers. A 50 lb bag of type A contains 8 lb of nitrogen, 2 lb of phosphorous, and 4 lb of potassium. And 4 lb of potassium. A 50 lb bag of type B fertilizer contains 5 lb of each of nitrogen, phosphorous and potassium. A field needs at least 440 lb of nitrogen, 260 lb of phosphorous and 360 lb of potassium.. Each 50 lb bag of type A costs $30 and each 50 lb bag of type B costs $20. How many 50 lb bags of each type of fertilizer should he use to minimize his cost while meeting the requirements?
S1 is the region $-2x + y \leq 10 \text{ and } 2x + y \geq 10 \text{ and } y \geq 0$.

a) Sketch S1.

a) Is S1 bounded or unbounded?

b) Does $P = 2x + 5y$ have a minimum on S1? If so, what is the minimum and at what point or points does it occur?

c) Does P have a maximum on S1? If so what is the maximum and at what point does it occur?

S2 is the region $-2x + y \leq 10 \text{ and } 2x + y \geq 10 \text{ and } x \leq 6$.

d) Is S2 bounded or unbounded?

e) Does $P = 2x + 5y$ have a minimum on S2 and if so, what is the minimum and at what point or points does it occur?

f) Does P have a maximum on S2? If so what is the maximum and at what point does it occur?
3. Fill in the blank with the appropriate symbol choosing from \( \in, \cup, \cap, \subseteq, \emptyset \).

\[ \{1, 2\} \underline{\bigcirc} \{1, 2, 3, 4\} \]

\[ \{1, 2\} \cap \{3, 4\} = \underline{\{\}} \]

\[ \{1, 2, 3\} \underline{\bigcap} \{3, 4, 5\} = \{1, 2, 3, 4, 5\} \]

\[ \{1, 2, 3\} \underline{\bigcap} \{3, 4, 5\} = \{3\} \]

4. Draw Venn diagrams for each set.

\[ (E \cap F) \cup G \]

\[ (E \cap F) \cup G^c \]

\[ (E \cap F^c) \cup G \]

\[ E \cap (F^c \cup G) \]