Name: Philip Franchi-Pereira ....

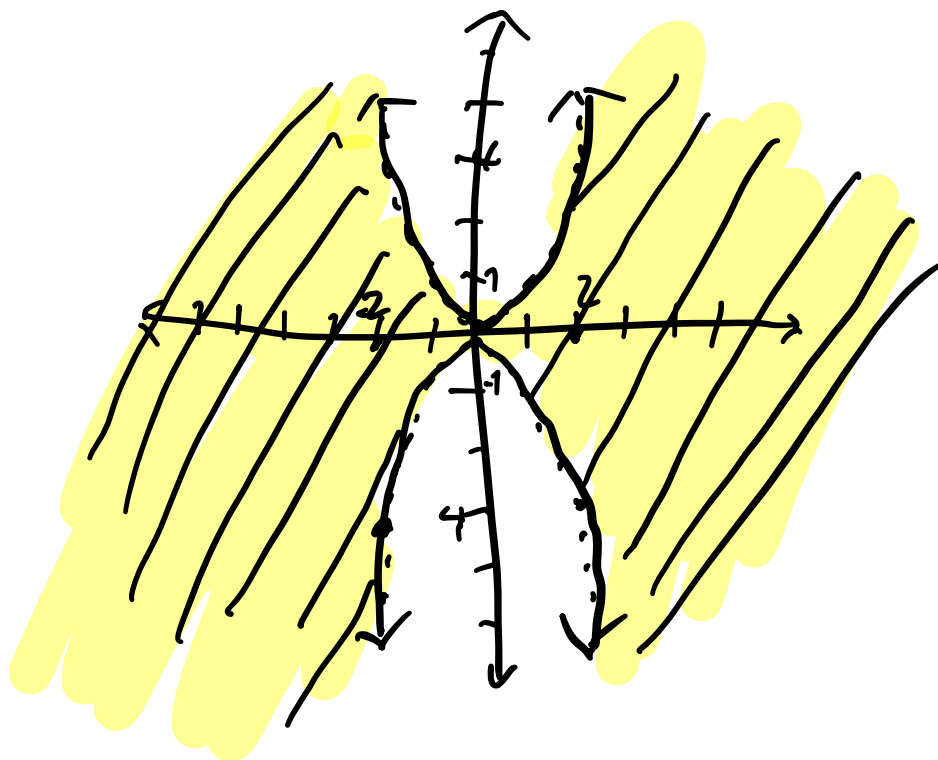1. (§1.1) List the elements in $S = \{x \in \mathbb{Z} : -2 < x \le 7\}$ and compute $|S|$.

$$S = \{-1, 0, 1, 2, 3, 4, 5, 6, 7\} \quad |S| = 9$$

2. (§1.1) Sketch the following set of points in the x-y plane. $\{(x, y) \in \mathbb{R}2 : (y - x\,2\,)(y + x\,2\,) < 0\}$.

$$\left(y - x^2\right)\left(y + x^2\right) = y^2 - x^4 \text{, and so the set can be expressed as}$$

$$\{(x, y) = R^2 : y^2 < x^4\}$$

$$\{(x, y) = R^2 : \pm y < x^2\}$$

3. (§1.3-1.4) List the objects in $\{X \in \mathcal{P}(\{1,2,3\}): 2 \in X\}$.

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

$$P(A) = \{\emptyset, \{1, 2, 3\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{2, 3\} \{1, 3\}\}$$

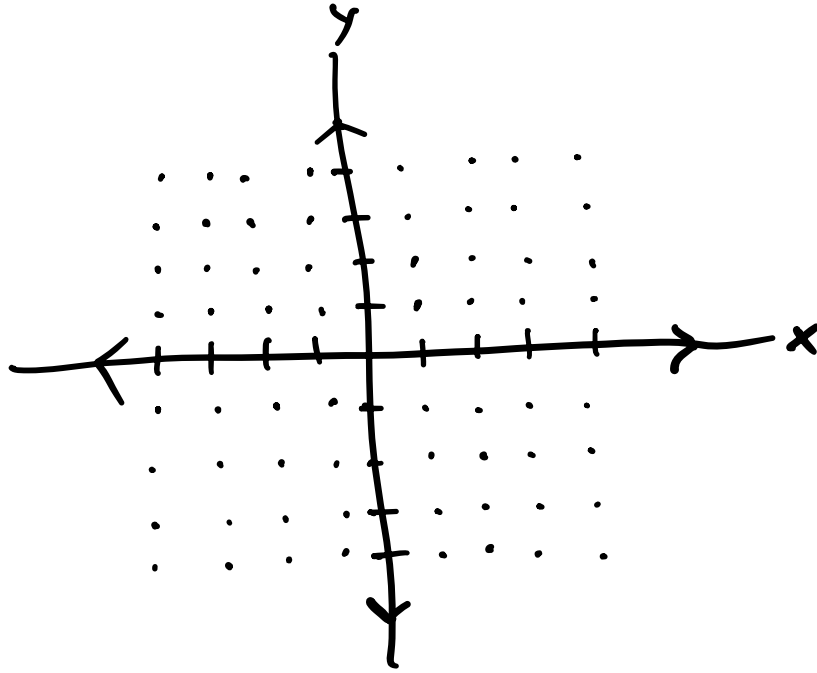$$\{X \in P(A) : 2 \in X\} = \{\{1, 2, 3\}, \{2\}, \{1, 2\}, \{2, 3\}\}$$

4. (§1.3) Suppose $n \in \{0,1,2,3,4\}$. Determine $Sn = \{X: X \subseteq \{1,2, \beta\}, |X| = n\}$.

$$S_0 = \emptyset \quad S_1 = \{1\} \text{ or } \{2\} \text{ or } \{\beta\}$$

$$S_2 = \{1, 2\} \text{ or } \{1, \beta\} \text{ or } \{2, \beta\}$$

$$S_3 = \{1, 2, \beta\} \qquad S_4 = \emptyset$$

5. (§1.2) Sketch the Cartesian product on the x-y plane $\mathbb{R}2 : \mathbb{Z} \times \mathbb{Z}$

6. (§1.4) Suppose that $|A| = m$ and $|B| = n$. Find the cardinality: $|\mathcal{P}(A \times \mathcal{P}(B))|$.
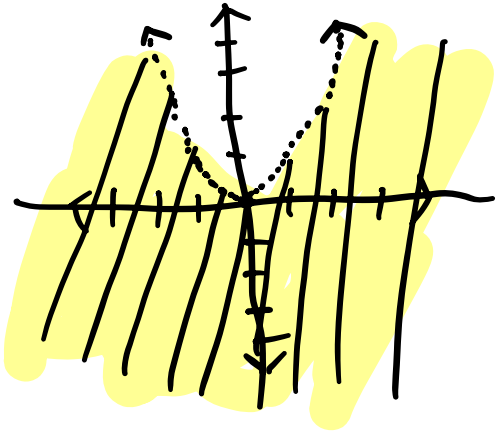
$$|A| = m, |P(B)| = 2^n$$
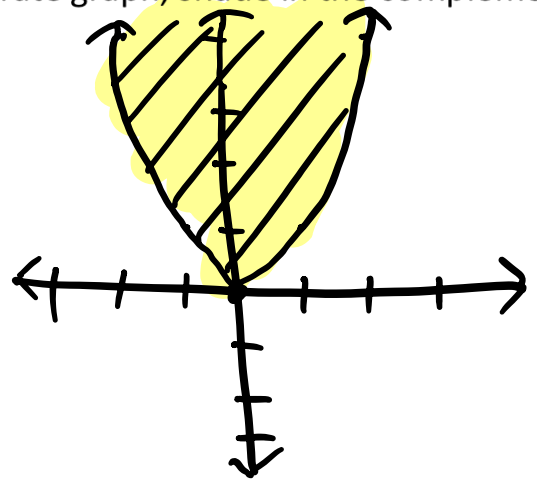
$$|A \times P(B)| = |A| \cdot |P(B)| = m \cdot 2^n$$

$$|P(A \times P(B))| = 2^{m \cdot 2^n}$$

7. (§1.6) Sketch the set $S = \{(x, y) \in \mathbb{R}2 : y < x\, 2\}$. On a separate graph, shade in the complement S.

S

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8. (§1.5-1.7) Draw a Venn diagram for $(A - B) \cup C$.