

Name:\_\_\_\_\_

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Score:\_\_\_\_\_

**Directions** This is just a quick quiz to test your knowledge of various definitions. Most questions are short-answer. You need not explain your work unless asked.

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1. **Short answer.** Write each of the following sets by listing its elements between braces or denoting it with a familiar symbol or symbols.

(a)  $\{x \in \mathbb{Z} : |3x| \leq 10\} =$

(b)  $[5, 7] \cap [7, 10] =$

(c)  $\{x \in \mathbb{R} : \sin(\pi x) = 0\} - \mathbb{Z} =$

(d)  $\mathcal{P}(\{1, 2\} \times \{\emptyset\}) =$

(e)  $\bigcap_{n \in \mathbb{N}} [3, 5 + 1/n] =$

(f)  $(\{0, 3\} \times \mathbb{N}) \cap (\mathbb{N} \times \{5, 6\}) =$

(g)  $(\mathbb{R} - \mathbb{N}) \cap \mathbb{Z} =$

(h)  $\{X : X \subseteq \{3, 4\} \cap X\} =$

2. **Short answer.** Write the following sets in set-builder notation.

(a)  $\{\dots, -3, 2, 7, 12, 17, 22, 27, \dots\} =$

(b)  $\left\{\frac{1}{3}, \frac{2}{9}, \frac{3}{27}, \frac{4}{81}, \dots\right\} =$

3. Write a truth table for the expression:  $(P \Leftrightarrow Q) \Rightarrow \sim (P \vee Q)$

4. Consider the following statement:

*For every subset  $X \subseteq \mathbb{N}$ , there is a subset  $Y \subseteq \mathbb{N}$  for which  $|X - Y| = 1$ .*

(a) Is this statement true or false? Explain.

(b) Write the statement in symbolic form.

(c) Write the negation of the statement as an English sentence.

5. This question involves lists made from the symbols  $A, B, C, D, E, F$ . How many length-6 lists can be made from these symbols if repetition is allowed and the first **or** last entry must be an  $A$ ? (Show your work. It is OK to leave your final answer in unsimplified form.)