Mathematics 300

Quiz 34 **Name:**_____

You must show your work to get full credit.

1. Let A be the set of all squares of odd integers and $B = \{x \in \mathbb{Z} : x \equiv 1 \pmod 4\}$.

(a) List four elements of A. _____

(b) List four elements of B. _____

(c) Prove $A \subseteq B$.

(d) Prove $B \not\subseteq A$.

2. Let

$$A = \{6u - 4v : u, v \in \mathbb{Z}\} \qquad B = \text{Set of even integers.}$$

(a) List four elements of A. _____

(b) List four elements of B. _____

Show $A = B$. This is done in two steps:
(c) Prove $A \subseteq B$.

(d) Prove $B \subseteq A$.

(e) Write the punch line.

3. Let $P = \{x \in \mathbb{R} : |x - 2| < 1\}$, and let S be the closed interval $S = [0, 5]$. Prove $P \subseteq S$.

(a) Solve the inequality $|x - 2| < 2$ and write P in interval notation.

$P =$ _____

(b) Show $P \subseteq S$.

4. The ***power set***, denoted by $\mathcal{P}(A)$ of a set A is the set whose elements are all the subsets of A.

(a) What is the power set of $\varnothing$? $\mathcal{P}(\varnothing) =$ _____

(b) What is the power set of $\{1, 2, 3\}$? $\mathcal{P}(\{1, 2, 3\}) =$ _____

(c) What is $(\{1\}))$? $\mathcal{P}(\mathcal{P}(\{1\})) =$ _____