

## Math 2001: PHW2

1. Consider the set of positive integers which give a remainder of 3 when divided by 4. Give two different descriptions of this set using set-builder notation.
2. From the book do problems:
  - (a) 1.1.A (numbers 4, 8, 12, 16)
  - (b) 1.5.3
3. Give examples of the following, or explain why they do not exist.
  - (a) An infinite set with a finite number of subsets,
  - (b) A finite set with an infinite number of subsets,
  - (c) A finite set with the same number of subsets and elements.
4. Let  $A$  be a set, and let  $B = P(A)$  be the power set of  $A$ . Is  $A \in B$  or  $A \subseteq B$ ? Justify your answer.
5. What is the number of subsets of the set  $\{\{1, 2, 3\}, \{1\}, \{1, 4\}, \{1, 4, 5, \{1, 2\}\}, \{1, 2, 3, 4\}\}$ ?
6. What is the number of subsets of  $\{a, b, c, d, e, f\}$  which all contain  $c$ ? Generalize by determining how many subsets of  $\{1, 2, \dots, n\}$  contain 1.