Math 2001 - Assignment 1

Due January 24, 2020

(1) Element, subset or neither? Explain for each of the following whether $A \in B$ and $A \subseteq B$ are true or false:
   (a) $A = 4, B = \mathbb{Z}$ (b) $A = \{1, 2, 3\}, B = \mathbb{Z}$
   (c) $A = \{1, 2\}, B = \{1, 2, \{1, 2\}\}$
(2) Are the following true for $A = \{1, \{2, 3\}\}$ or not?
   (a) $\{2, 3\} \in A$ (b) $\{2, 3\} \subseteq A$ (c) $\emptyset \in A$ (d) $|A^2| = 9$.
(3) [1, Section 1.1]: Exercises 1,12,15
(4) Write each of the following sets using a defining property (Axiom of Specification) and using a function (Axiom of Replacement):
   (a) $A = \{\ldots, -8, -4, 0, 4, 8, 12, \ldots\}$
   (b) $B = \{0, 1, 2\}$
   (c) $C =$ the set of even squares
(5) [1, Section 1.1]: Exercises 29,38
(6) Let $A = \{0, 1\}$ and $B = \{a, b, c\}$. Enumerate the elements of the following sets:
   (a) $B \times A$ (b) $A \times \emptyset$ (c) A^3

References

[1] Richard Hammack. The Book of Proof. Creative Commons, 3nd edition, 2018. Available for free: `http://www.people.vcu.edu/~rhammack/BookOfProof/`