

HOMWORK 3

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- (a) $\{-1, 1\}$
- (b) $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$
- (c) $\{0, 1, 4, 9, 16, 25, 36, 49, 64, 81\}$
- (d) $\{\emptyset\}$

Page 125, Question 2

- (a) $\{3n \mid n \in \mathbb{N}, 0 \leq n \leq 4\}$
- (b) $\{n \mid n \in \mathbb{Z}, -3 \leq n \leq 3\}$
- (c) $\{x \mid x \text{ is an alphabet}, m \leq x \leq p\}$

Page 125, Question 5

- (a) These sets are equal because they contain the same values, order and occurrences do not matter.
- (b) These sets are not equal.
- (c) These are not equal because \emptyset is an element whereas in the second example $\{\emptyset\}$, \emptyset is an element of a set, indicated by the brackets.

Page 125, Question 6

$$A = \{2, 4, 6\}$$

$$B = \{2, 6\}$$

$$C = \{4, 6\}$$

$$D = \{4, 6, 8\}$$

From this, we can see that both B and C are subsets of A, with C also being a subset of D.

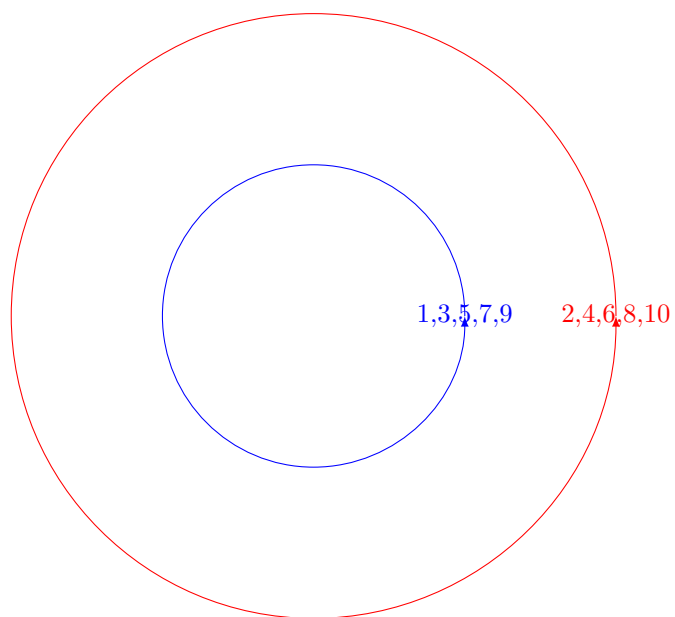
Page 125, Question 7

- (a) 2 is an element of this set.
- (b) 2 does not belong to this set because it is not the square of an integer.
- (c) 2 is an element of this set.
- (d) 2 is not an element of this set.
- (e) 2 is not an element of this set.
- (f) 2 is not an element of this set.

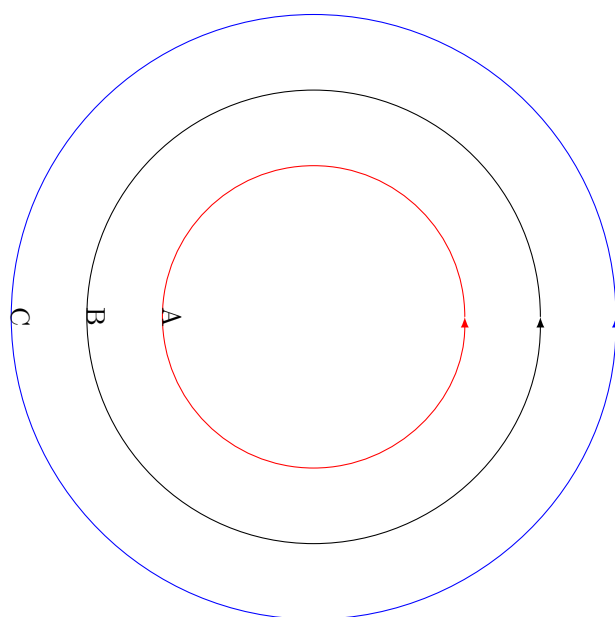
Page 125, Question 11

- (a) True, because x is an element of the set.
- (b) True, because all sets are subsets of themselves.
- (c) False, because $\{x\}$ is not within $\{x\}$.
- (d) True, because $\{x\}$ is within $\{\{x\}\}$.
- (e) True, because \emptyset is always a subset.
- (f) False, because \emptyset is not an element of the set.

Page 125, Question 12



Page 125, Question 14



Page 125, Question 18

The sets that qualify this condition are as follows:

$$A = \emptyset$$

$$B = \{\emptyset, \{\emptyset\}\}$$

Page 125, Question 20

- (a) The cardinality of \emptyset is $|\emptyset|$ which is 0
- (b) The cardinality of $\{\emptyset\}$ is $|\{\emptyset\}|$ is equal to 1
- (c) The cardinality of $\{\emptyset, \{\emptyset\}\}$ is $|\{\emptyset, \{\emptyset\}\}| = 2$
- (d) The cardinality of $\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$ is $|\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}| = 3$

Page 125, Question 21

- (a) $\{\emptyset, \{a\}\}$
- (b) $\{\emptyset, \{a\}, \{b\}, \{a, b\}\}$
- (c) $\{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}$

Page 125, Question 27

- (a) $A \times B = \{(a, y), (b, y), (c, y), (d, y), (a, z), (b, z), (c, z), (d, z)\}$
- (b) $B \times A = \{(y, a), (y, b), (y, c), (y, d), (z, a), (z, b), (z, c), (z, d)\}$