Lab: Background Material

a. 1. This set contains odd integers

2. This set contains even integers including 0. Because m is N, N is $0, 1, 2 \ldots$

3. This set contains integers that are both divided by 2 and 3. It means that the number is the least common multiple 6.

4. This set is impossible. Because $n = n+1$ is not a feasible function. This set is an empty set.

b. 1. $\{n \mid n = 10^m, \ m \in N \text{ and } m < 3\}$

2. $\{n \mid n = m, \ m \in Z \text{ and } m > 5\}$

3. $\{n \mid n = m, \ m \in N \text{ and } m < 5\}$

c. 1. No

2. Yes

3. $\{x, y, z\}$

4. $\{x, y\}$

5. $\{(x, x), (x, y), (y, x), (y, y)$
$(z, x), (z, y)\}$

6. $\{\emptyset, \{x\}, \{y\}, \{x, y\}\}$

2. 1. $f(2) = 7$

2. The domain of $f(n)$ is $\{1, 2, 3, 4, 5\}$
   The range of $f(n)$ is $\{6, 7\}$

3. $g(2, 10) = 6$

4. The domain of $g(n)$ is as below
   $\{ (1,6), (1,7), (1,8), (1,9), (1,10)$
   $(2,6), (2,7), (2,8), (2,9), (2,10)$
   $(3,6), (3,7), (3,8), (3,9), (3,10)$
   $(4,6), (4,7), (4,8), (4,9), (4,10)$
   $(5,6), (5,7), (5,8), (5,9), (5,10)$
   $\}$

   The range of $g(n)$ is
   $\{10, 9, 8, 7, 6\}$

5. $g(4, f(4)) = g(4, 7) = 8$
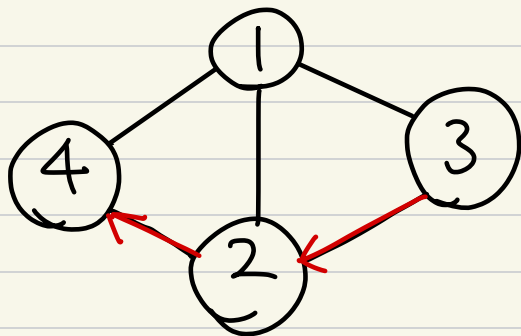
3. First, assume there is largest even number

$$\{n \mid n = 2m, \; m \in \mathbb{Z}^+\}$$

if m is the infinite number, $2m+2$ is a even number and greater than $2m$. So, there is not largest even number.

4.

deg(1) = 3
deg(2) = 3
deg(3) = 2
deg(4) = 2

5.

1. 2 strings that belong to the language include the subset 01

   ①   1010

   ②   0011

2. 2 strings that don't belong to the language

   ①   11111

   ②   0000

3. This language include the substring 01 within the string. Before and after the substring should include the (0 ∪ 1)