EE2302 Foundations of Information and Data Engineering

Assignment 1 **Due: 11 pm, Sep 9 (Wed)**

Full mark: 16 points

1. (4 points) Let

$$C = \{n \in Z \mid n = 6r - 5 \text{ for some integer } r\},$$
$$D = \{m \in Z \mid m = 3s + 1 \text{ for some integer } s\}.$$

Prove or disprove each of the following statements:

a) $C \subseteq D$;

b) $D \subseteq C$.

2. (4 points) Let

$$B = \{y \in \mathbb{Z} | y = 10b - 3 \text{ for some integer } b\},$$

and

$$C = \{z \in \mathbb{Z} | z = 10c + 7 \text{ for some integer } c\}.$$

Is $B = C$? Prove or disprove it.

3. (2 points) Find the domain and range of the function that assigns to each nonnegative integer its last digit.

4. (2 marks) Let n be the smallest integer not describable in fewer than twelve English words. Is n well defined? Explain your answer.

5. (4 points) Can there exist a computer program that has as output a list of all the computer programs that do not list themselves in their output? Explain your answer.