1. Fill in the blank:
   A linear system can have ________________________________ solutions.

2. For each system given below, circle the possibilities for the solution set, and give an example of a linear system with that solution set.

   (a) A linear system with \( n \) variables and \( m \) equations, with \( n > m \):
      i. 0 solutions
      ii. exactly 1 solution
      iii. infinitely many solutions
   (b) A linear system with \( n \) variables and \( m \) equations, with \( n \leq m \):
      i. 0 solutions
      ii. exactly 1 solution
      iii. infinitely many solutions
   (c) A homogeneous linear system with \( n \) variables and \( m \) equations, with \( n > m \):
      i. 0 solutions
      ii. exactly 1 solution
      iii. infinitely many solutions
   (d) A homogeneous linear system with \( n \) variables and \( m \) equations, with \( n \leq m \):
      i. 0 solutions
      ii. exactly 1 solution
      iii. infinitely many solutions

3. For each statement below, determine if it is True or False. Justify your answer.

   (a) Any linear system is equivalent to a unique system in echelon form.
   (b) Any linear system is equivalent to a unique system in reduced echelon form.
   (c) If a linear system has infinitely many solutions, there must be more equations than variables.
   (d) If there are two (distinct) known solutions to a linear system, the system must have infinitely many more solutions.
   (e) If \( \mathbf{s} = (s_1, \ldots, s_n) \) is a solution to a homogeneous system of equations, then any multiple of \( \mathbf{s} \) is also a solution.