MACM 201 Homework 4 (Quiz Oct. 9)

1. For each recurrence below, find the order and determine if it is linear. If it is linear, determine if it is homogeneous.

   (a) $5x_n - 7x_{n-3} + 5x_{n-5} = n^2$

   (b) $10x_{n+3} - 4x_{n+1} = x_n^2$

   (c) $11x_n = 3x_{n-1} + 2x_{n-4} = 0$

   (d) $11x_n - 5x_{n-2} + 3x_{n-5}x_{n-6} = 0$

2. What is the set of all solutions to the recurrence $x_n = 7x_{n-1}$?

3. For each recurrence below, find the characteristic equation and use this to find all real numbers r so that $x_n = r^n$ is a solution.

   (a) $x_n - 6x_{n-1} + 5x_{n-2} = 0$

   (b) $2x_n - 9x_{n-1} + 5x_{n-2} = 0$

   (c) $x_n - 6x_{n-1} + 9x_{n-2} = 0$

   (d) $x_n + 3x_{n-1} + 4x_{n-2} = 0$

4. For parts (a)-(c) in the previous problem, describe infinitely many solutions to the given recurrence.