

MathQuest: Difference Equations

Classifying Difference Equations

1. The equation $a_{n+1} = na_n + a_n a_{n-1} + n^3$ is nonlinear. Which term makes it nonlinear?
 - (a) na_n
 - (b) $a_n a_{n-1}$
 - (c) n^3
 - (d) All of the above

2. What is the order of the difference equation $a_{n+5} = 3a_{n+1} + a_{n+2} + 5$?
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) 5
 - (f) 6

3. How many initial conditions are needed to fully specify the sequence described by a 4th order difference equation?
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) 5

4. Which of the following difference equations is nonhomogeneous?
 - (a) $a_{n+1} = 3a_n$
 - (b) $b_{n+2} = 5b_n b_{n-1}$
 - (c) $c_{n+1} = 4c_n + 5n$
 - (d) $d_{n+1} = 3d_n + d_{n-2}$
 - (e) More than one of the above is nonhomogeneous.
 - (f) None of the above are nonhomogeneous.