

# General Mathematics and Computational Science I

## Exercise 18

November 30, 2006

1. Show that

$$\frac{1}{(1-x)^2} = 1 + 2x + 3x^2 + 4x^3 + \dots$$

*Hint:* Use the result of Exercise 9, Question 1.

2. Use the method of generating functions to solve the difference equation

$$a_{n+1} = 2a_n - a_{n-1}$$

with  $a_0 = 1$  and  $a_1 = 2$ .

*Hint:* Use the result from Question 1 above.

3. Find the equilibrium points of the system

$$x_{n+1} = 2x_n - y_n,$$

$$y_{n+1} = x_n + 3y_n.$$