General Mathematics and Computational Science I

Exercise 10

October 13, 2005

1. Show that

$$\binom{n+1}{k+1} = \sum_{j=k}^{n} \binom{j}{k}$$

   for every $0 \le k \le n$.

2. Use the method of generating functions to find a closed form expression for the members of the generalized Fibonacci sequence

$$a_0 = A \,,$$
$$a_1 = B \,,$$
$$a_n = a_{n-1} + a_{n-2} \,.$$

3. Use the method of generating functions to find a closed form expression for the members of the sequence

$$b_0 = 1 \,,$$
$$b_1 = \cos\theta \,,$$
$$b_n = 2\cos\theta \, b_{n-1} - b_{n-2} \,,$$

   where θ is an arbitrary real number.