Math 2534  Homework 5  Sequences and PMI

Put all work on your own paper neatly

Problem 1: Verify that \( \sum_{i=1}^{n} i(i!) = (n+1)! - 1 \) where \( n = 6 \).

Problem 2: Given the recursive sequence \( a_1 = 1, a_2 = 2, a_n = a_{n-1} + 2a_{n-2}, n > 2 \):
   a) Give the first four terms in this sequence.
   b) Find the sequence function that will give the same results.

Problem 3: If you are given a sequence function \( f(n) = 2n + 1 \), find the recursive sequence that will give you the same results.

Problem 4: Reduce the following factorials.
   a) \( \frac{(n-2)!}{(n+2)!} \)
   b) \( \frac{(n)!}{(n-4)!} \)

Problem 5: Determine for what values of \( n \) \( 3^n < n! \) may be true when \( n \) is a natural number.

Problem 6: Use PMI to prove the following:

Theorem: For all natural numbers, \( \sum_{i=1}^{n} 5i - 4 = \frac{n(5n-3)}{2} \)