Math 253N

1. Rewrite each expression as a single sum whose generic term involves  $x^n$ , or a single term or two p; us a sum whose generic term involves  $x^n$ .

(a) 
$$\sum_{n=1}^{\infty} na_n x^{n-1}$$
 (b)  $\sum_{n=1}^{\infty} na_n x^{n-1} + \sum_{n=0}^{\infty} a_n x^n$  (c)  $x \sum_{n=2}^{\infty} n(n-1)a_n x^{n-2} + \sum_{n=0}^{\infty} a_n x^n$ 

2. Find a series solution to y'' - y = 0 using summation notation. Follow these general guidelines:

- Subtitute the appropriate sums for y and y'' into the differential equation.
- Shift the index in the sum for y'' so that both sums have the same power of x.
- Combine the two sums into one sum that must equal zero.
- In order for your combined sum to equal zero, each coefficient must equal zero. Set the general coefficient equal to zero and solve for  $a_{n+2}$  to get the recursion relation for the coefficients
- Use the recursion relation to find the first four terms in the two series for  $a_0$  and  $a_1$ . Write out the solution to the differential equation using  $\cdots$  notation.
- If possible, determine summation notations for the two parts of your solution.

## Math 253NAssignment 20Due at the start of class Friday, June 2nd

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