Homework 9

Math 253

Due December 2nd at 11:59 PM

Work through the following problems and write your solutions on separate sheets of paper, showing all your work. There are 32 points possible: 8 are from attempting all the problems thoroughly, and three problems will be selected to be graded for correctness for 8 points each.

6.3: 117, 119, 121, 122, 123, 133, 135, 171

6.4: 175, 183, 186, 200, 211, 213, 215, 235, 241

An additional problem (also required)

Express the function $\frac{1}{(1+x)^2}$ as a Maclaurin series in a few different ways:

1. By squaring the Maclaurin series for $\frac{1}{1+x}$.

2. By differentiating the Maclaurin series for $-\frac{1}{1+x}$.

3. By using the binomial series expansion for $(1+x)^r$ with $r = -2$.

4. By expressing $\frac{1}{(1+x)^2}$ as $\frac{1}{1-(-2x-x^2)}$ and using the geometric series formula.

5. By finding an expression for the nth derivative of $\frac{1}{(1+x)^2}$ at $x = 0$ and using the general formula for a Maclaurin series.

In every case, write the Maclaurin series in sigma notation and determine the interval of convergence. Make sure they all match!