

Name: \_\_\_\_\_

### Mock Exam #3

Math 231 AD1

1. (10 points) Determine the interval of convergence for the series  $\sum_{n=1}^{\infty} n^{-2}(x+6)^n$ .

2. (10 points) Determine whether the series  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n\sqrt{n}}$  is absolutely convergent, conditionally convergent, or divergent.

3. (10 points) Determine the Taylor series centered at  $-1$  for  $f(x) = x^3 + x$ .

4. (2 points each) Complete the list below by writing down the Maclaurin series and the interval of convergence for each function.

•  $\frac{1}{1-x} = 1 + x + x^2 + x^3 + x^4 + x^5 + \dots$  for  $-1 < x < 1$

•  $\ln(1+x) =$

•  $\sin(x) =$

•  $\cos(x) =$

•  $\arctan(x) =$

•  $e^x =$

5. (10 points) Determine the Maclaurin series for  $f(x) = \frac{2x^2}{1+4x^2}$  along with its interval of convergence.

6. (a) (5 points) Use an appropriate Taylor polynomial of degree 2 to obtain a good estimate for  $\sqrt{103}$ . You do not need to simplify your answer.

(b) (5 points) Give an upper bound on the error of your estimate.

7. (10 points) Give the first three terms of the Maclaurin series for  $\frac{1}{\sqrt[3]{1 + \frac{x}{2}}}$ .

8. (10 points) Use power series expansion to compute  $\lim_{x \rightarrow 0} \frac{1 - \cos(x)}{x}$ .