Name:_____

MA 2733 Section 01 *Practice Exam 2* *November 19, 2019*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work, answer or there is no justification to a solution, you will receive little or no credit!

For problems 1 and 2, find the radius of convergence and interval of convergence of the following series:

1. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n5^n} x^n$

2. $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n}}{8^n} (x+6)^n$

For problems 3 and 4, evaluate the following indefinite integral as a power series:

3. $\int \tan^{-1} x \; dx$

4. $\int \dfrac{dx}{1+x^{11}}$

For problems 5 and 6, using the definition of Taylor series, compute the Taylor series of $f(x)$ at the given point a.

5. $f(x) = \sqrt{x}$ at $a = 16$.

6. $f(x) = e^{-2x}$ at $a = 1$.

For problems 7 and 8, find the points on the curve where the tangent is horizontal or vertical.

7. $x = t^3 - 3t$ and $y = t^3 - 3$

8. $x = \cos\theta$ and $y = \cos(3\theta)$

For problems 9 and 10, find the area of the region that lies inside both curves.

9. $r = 1 + \cos\theta$ and $r = 1 - \cos\theta$

10. $r = a\sin\theta$ and $r = b\cos\theta$ where $a, b > 0$

For problems 11 and 12, find the exact length of the polar curve.

11. $r = 2\sin\theta$ for $0 \leq \theta \leq 2\pi$

12. $r = 2(1 + \cos\theta)$

13. Show that if $\lim_{n\to\infty} \sqrt[n]{c_n} = c$ where $c \neq 0$, then the radius of convergence of the power series

$$\sum_{n=1}^{\infty} c_n x^n$$

is $R = \dfrac{1}{c}$.