

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Find the radius of convergence and the interval of convergence of the series

$$\sum_{n=1}^{\infty} (-1)^n \frac{(x+2)^n}{n2^n}.$$

2. Find a power series representation for the function

$$f(x) = \frac{x}{9 + x^2}$$

and determine its interval of convergence.

3. (a) State precisely the formula for a MacLaurin series.

(b) Develop the MacLaurin series for $f(x) = xe^{5x}$ and find its radius of convergence.

4. Find the equations of the tangent lines to the parametric curve

$$\begin{cases} x = 3t^2 + 1 \\ y = 2t^3 + 1 \end{cases}$$

that pass through the point $(4, 3)$.

5. Find the length of the parametric curve $\begin{cases} x = \frac{t}{1+t} \\ y = \ln(1+t), \end{cases} \quad 0 \leq t \leq 2.$