

Your name: _____

Rec. Instr.: _____

Rec. Time: _____

Show all your work in the space provided under each question. Please write neatly and present your answers in an organized way. You may use your one sheet of notes, but no books or calculators. This exam is worth 60 points. The chart below indicates how many points each problem is worth.

Problem	1	2	3
Points	/10	/10	/12
Problem	4	5	Total
Points	/16	/12	/60

1. Determine whether the series converges or diverges.
List each test of convergence used.

$$\sum_{n=1}^{\infty} \left(\frac{4n^3 - 3}{5n^3 + 7} \right)^n$$

2. Use the power series for $\frac{1}{1-x}$ (a geometric series) to find the Taylor series centered at $a = 0$ for the function below.

$$f(x) = \frac{4x^2}{9 - x^3}$$

3. Find the second Taylor polynomial $p_2(x)$ centered at $a = -\frac{\pi}{4}$ for the function

$$f(x) = \tan(x).$$

4. Find the interval of convergence for the power series.

$$\sum_{n=1}^{\infty} \frac{(x+2)^n}{n \cdot 3^n}$$

5. A curve is given by the parametrization $x = t^2 + 1$, $y = 4t^5 + t^4$.

(a) Find an equation of the tangent line to this curve at the point when $t = 1$.

(b) Find the concavity $\frac{d^2y}{dx^2}$ of the curve at the point when $t = 1$.