

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.

For each test of convergence that you use, either give the name of the test, or briefly describe what the test says.

This exam is worth 60 points. The chart below indicates how many points each problem is worth.

Problem	1	2	3	4
Points	/8	/10	/12	/10
Problem	5	6		Total
Points	/8	/12		/60

1. Determine whether the series converges or diverges. Explain.

$$\sum_{n=1}^{\infty} \frac{n^2}{n^3 + 1}$$

2. Determine whether the series converges or diverges. Explain.

$$\sum_{n=0}^{\infty} \frac{\cos(n)}{3^n}$$

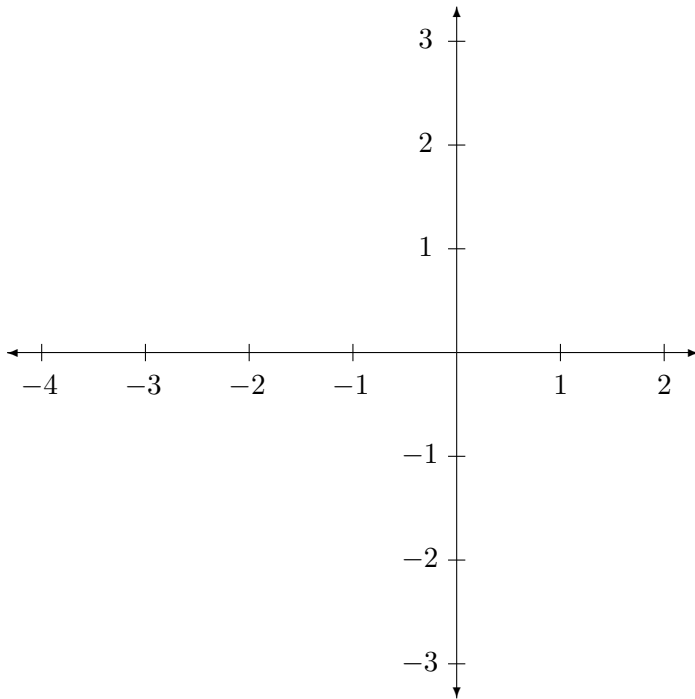
3. Find the interval of convergence of the power series.

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

4. A curve is given by the parametrization.

$$x = t^2 - 3 \quad \text{and} \quad y = t^3 - 3t$$

- (a) Graph the curve for $-2 \leq t \leq 2$ by plotting points when $t = -2, -1, 0, 1, 2$. Draw arrows indicating the direction of motion.



- (b) Find the slope $\frac{dy}{dx}$ when $t = 2$.

5. Find the Maclaurin series (the Taylor series at $c = 0$) for the function. You need to find a formula for the general term. Hint: Do not take derivatives.

$$f(x) = \frac{x}{4 + x^2}$$

6. Use the integral test to determine whether the series converges or diverges. Note you must show that the function $f(x) = \frac{1}{x(\ln(x))^2}$ is decreasing.

$$\sum_{n=2}^{\infty} \frac{1}{n(\ln(n))^2}$$