

Name: _____ UT EID: _____
Present Calculus Course: _____ Instructor: _____
Permanent Mailing Address: _____

E-mail address: _____
School (Natural Sciences, Engineering, etc.) _____

Show all work in your solutions; turn in your solutions on the sheets provided.
(Suggestion: Do preliminary work on scratch paper that you don't turn in; write up final solutions neatly and in order; write your name on all pages turned in.)

1. Evaluate $\lim_{x \rightarrow \infty} \frac{\sqrt{x^3 - x^2 + 3x}}{\sqrt{x^3} - \sqrt{x^2} + \sqrt{3x}}$.

2. Determine whether these series converge or diverge. (Be sure to justify your answer.)

$$(a) \sum_{n=2}^{\infty} \frac{n^8 - 1}{n^9 - 1} \qquad (b) \sum_{n=2}^{\infty} \frac{1}{\ln(n!)}$$

3. Compute $\lim_{x \rightarrow 0} \frac{\cos(2x) + 2 \sin(x^2) - 1}{x^4}$.

4. The four points

$$A = (-6, -2, 3), \quad B = (-6, 8, 3), \quad C = (-7, 5, 3), \quad D = (4, -6, 5)$$

are all equally far from a point P . Find P .

5. Compute the minimum value of the function

$$f(u, v) = \left(u - v\right)^2 + \left(3 - u - \left(\frac{5}{v}\right)\right)^2$$

on the region where $v > 0$.