

MAT 2213.01 — Calculus III
Final Exam — Fall 1993

Name _____

Show your work. Answers alone are not sufficient. Box your answers. All questions carry the same weight.

1. Find all maxima, minima and saddle points of the function

$$f(x, y) = x^2 + y^5 - 5y.$$

2. Find a unit vector that is normal to the surface

$$z = y^2 + e^{(x+y)}$$

at the point $(0, 0, 1)$.

3. Find the Taylor series of the function

$$f(x) = \frac{x^{15}}{3 + x^5}.$$

4. Find the interval of convergence for the power series

$$\text{a) } \sum_{n=0}^{\infty} (-1)^n x^n, \quad \text{b) } \sum_{n=0}^{\infty} \frac{x^{2n}}{n!}.$$

5. Find the distance from the point $(1, 5, -3)$ to the plane defined by $5x + 2y - z = 7$.

6. Given that the position of a particle at time t is defined by $\mathbf{r}(t) = t\mathbf{i} + e^{-t}\mathbf{j}$, find the component of the acceleration normal to the velocity vector.

7. Find the area of the triangle with vertices $(1, 2, 0)$, $(0, 1, -1)$, $(0, 0, 1)$.

1	2	3	4	5	6	7	total (140)