Name (Please Print) _____ Rec. Instr. _____

Your Signature _____ Class Time _____

ANALYTIC GEOMETRY AND CALCULUS II

Exam 3

November 18, 1997

Be neat, clear and complete. Show all work. No notes, books, reference material or calculators are allowed. No credit will be given for answers without supporting work.

(10) 1. a) Find an equation of the parabola with vertex $(2, 3)$ and directrix $y = -1$.

(14) b) For the conic $9x^2 + 54x + 4y^2 - 16y + 61 = 0$, find the center, foci, vertices, directrices, and eccentricity of the conic. Also, graph the conic.

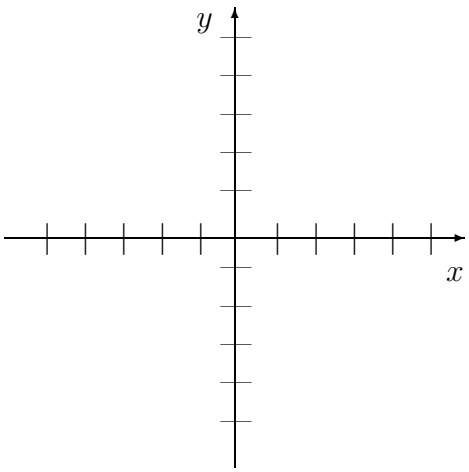
a) center

b) vertices

c) foci

d) directices

e) eccentricity



(11) 2. Find the area inside the limaçon $r = 4 + 2\sin\theta$.

3. Determine the type of conic represented by each equation. **GIVE VALID REASONS.**

(4) a). $5x^2 - 2xy + 3y^2 + 4x - 2y + 5 = 0$

(4) b). $x^2 + 6xy - 2y^2 + 5x - y + 2 = 0$

(6) 4. Determine an angle, α, of rotation so that the conic $x^2 + 2xy + 3y^2 + x - 2y + 5 = 0$ is in standard (horizontal or vertical) position.

5. Find the limit of the sequence, or show that the limit doesn't exist.

(8) a) $\lim_{n\to\infty} \dfrac{2+(-1)^n}{\ln n}$

(8) b) $\lim_{n\to\infty} \left(1+\dfrac{2}{n}\right)^n$

6. Find the sum of the series.

(9) a) $\sum_{n=0}^{\infty} \dfrac{2^n+5^n}{6^n}$

(9) b) $\sum_{n=1}^{\infty} \dfrac{2}{4n^2-1}$

(14) 7. a) Write the Taylor Polynomial $P_5(x)$ of degree $n = 5$ at $a = \pi$ for the function $f(x) = \sin x$. Also, write the remainder term $R_5(x)$.

(3) b) Write the Taylor series for the function $f(x) = \sin x$ at $a = \pi$.