Name _____ Instructor _____

Analytic Geometry and Calculus II
Math 221 - Test 2A
July 18, 1997

**You must show all relevant work to receive full credit. The point value of each problem is shown in the left hand margin.**

**(10)** 1. Integrate

$$\int \frac{x^4 + 3x^2 + 1}{x^3 + x}\, dx$$

**(10)** 2. Integrate

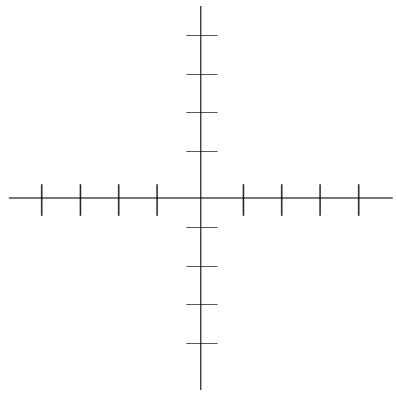
$$\int \frac{\sqrt{9-x^2}}{x^2}\, dx$$

**(20)** 3. Integrate

a. $\displaystyle\int_{-8}^{1} \frac{1}{\sqrt[3]{x}}\, dx$

b. $\displaystyle\int_{1}^{\infty} \frac{1}{x^4}\, dx$

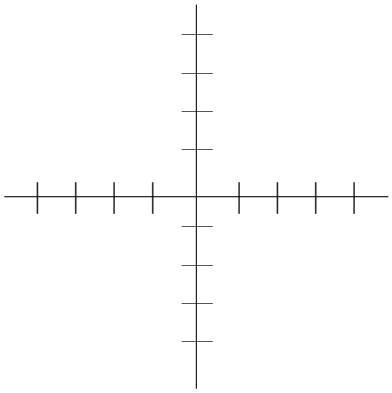
**(10)** 4. Sketch the graph of the polar equation $r = 1 - 2\cos\theta$.



**(10)** 5. Find the area of the region that is inside the circle $r = 1$ and outside $r = 2 + 2\cos\theta$.

**(10)** 6. Write the equation of the indicated conic section in standard form. Identify the vertex, focus, and directrix. Sketch the graph of the equation, showing these features on your graph.

$$y^2 - 4y - 4x + 4 = 0$$



_____ Standard Form

_____ Vertex

_____ Focus

_____ Directrix

**(10)** 7. Sketch the graph of $\dfrac{(x-3)^2}{4} - \dfrac{y^2}{9} = 1$, showing the center, asymptotes and vertices. (Label the center and the vertices.)

**(10)** 8. Determine whether or not the sequence $\{a_n\}$ converges, and find its limit if it does.

$$a_n = \frac{n^e + 1}{e^n}$$

**(10)** 9. Find the limit of the recursive sequence

$$\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$$