TECHNICAL CALCULUS I
Fall 1994
Final Exam

Name ______________________________

Find the equation and sketch the curve.

1. hyperbola: vertex $(0,13)$, center $(0,0)$, conjugate axis 24.

2. ellipse: center $(0,0)$, passes through $(0,3)$ and $(2,1)$.

3. Water is being drained from a pond in such a way that the volume of water in the pond is $V = 5000(60-t)^2$. At what rate the pond is being drained at $t = 4\,\text{hrs}$?

4. Sketch the graph using the scheme given in the class $y = x\sqrt{1-x^2}$.

5. What is the area of the largest rectangle which can be inscribed in the first quadrant under the curve $y = 4 - x^2$?

6. A particle moves along the path $y = \dfrac{1}{x}$ at a constant speed 100 m/sec. Find the velocity in the x-direction at the point $(2, \frac{1}{2})$.

7. A box with a square base is open at the top. If $108m^2$ of material are used, what is the maximal volume of the box?

8. Find dy at $x = 1$, $\Delta x = 0.01$, if $y = \sqrt{1 - \frac{x}{100}}$.

9. $\displaystyle\int \frac{x dx}{\sqrt{5x^2 + 1}} =$

10. Find the area under the curve $y = \sqrt[3]{x}$ between $x = 1$ and $x = 2$.