Name

The exam has 7 problems. Problems 2 and 3 are worth 15 points each. The others are worth 14 points each.

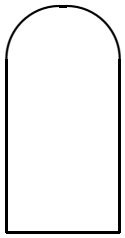
1. Given $y = \dfrac{x^2 + 3x + 1}{x - 1}$ List (showing all work):

   a) vertical asymptotes: _____

   b) horizontal asymptotes: _____

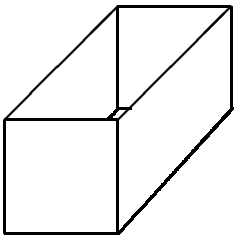
   c) all other asymptotes: _____

2. A Norman Window is a rectangle surmounted by a semicircle. The perimeter is 100 inches. Find the dimensions that will maximize the total area. Show work.



Answer=

3. An open rectangular box with square ends is to be built to hold 6400 cubic feet at a cost of \$0.75/ft^2 for the base and \$0.25/ft^2 for the sides. Find the most economical dimensions. Show work.



Answer=

4. Use linearization to estimate $\sqrt[3]{63}$. Show work.

Answer=

5. Perform one step of Newton's method to estimate the root of $f(x) = x^3 + 2x - 2$ between $x = 0$ and $x = 1$. Take $x_0 = \dfrac{1}{2}$. Show work.

$x_1 =$

6. Evaluate the integrals and show all work.

   (a) $\displaystyle\int x^{-5/4}\,dx$

Answer=

   (b) $\displaystyle\int \cos^2 8x\,dx$

Answer=

7. Solve $\dfrac{dv}{dt} = 8t + \csc^2 t, \quad v(\dfrac{\pi}{4}) = -7.$ Show work.

$v =$