MATH 1120 **Test 2** **Summer 2002**

Name : _____

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1. Let $f(x) = x^3 - 3x^2 - 24x - 6$.

   (a) Find the interval(s) where $f(x)$ is increasing and the interval(s) on which it is decreasing.

   (b) Find the relative maxima and relative minima, if any.

2. Find the absolute maximum and the absolute minimum of

$$f(x) = 4 - (x-1)^{2/3}$$

on the interval $[0, 9]$.

3. For a function $f(x)$, we have the information below. Sketch the graph of the function f:

Domain	$(-\infty, \infty)$
Asymptotes	None ($\lim_{x->-\infty} f(x) = \infty$, $\lim_{x->\infty} f(x) = \infty$).
Intervals where f is $\nearrow$ and $\searrow$	$\searrow$ on $(-\infty, 3)$;$\nearrow$ on $(3, \infty)$
Relative extrema	Relative minimum at $(3, -3)$
Concavity	Upward on $(-\infty, 0) \cup (2, \infty)$; Downward on $(0, 2)$
Points of inflection	$(0, 0)$ and (2, -16/9)

4. Find the horizontal and vertical asymtotes of the grahp of the function $f(x) = \frac{x+2}{x-2}$.(You need not sketch the graph.)

5. A man wishes to have a rectangular-shaped 2400-square-foot garden in his backyard. One side will be formed by a portion of the external wall of his house, two sides will be constructed of pine boards, and the fourth side will be made of galvanized steel fencing material. If the pine board fencing costs \$9 per running foot and the steel fencing costs \$3 per running foot, determine the dimensions of the enclosure that can be erected at minimum cost.

6. (a) Compute the accumulated amount A if the principal \$6000 is invested at 6% interest compounded quarterly for 10 years.

   (b) Find the effective rate corresponding to 10% per year compounded monthly.

7. Find the derivatives of the following functions

   (a) xe^{3x}

   (b) $\ln(5x^2 + 3x + 2)$

   (c) $\frac{e^x}{e^x+1}$

   (d) $x^2 \ln(3x + 1)$

   (e) $e^{-\sqrt{x}}$

   (f) $\frac{e^{3x+1}}{\ln(2x^2+1)}$

8. Suppose that a man died at time $t = 0$. In this case the amount of carbon 14 present in the bones at any time t obeys the law $Q(t) = Q_0 e^{-0.00012t}$. Skeletal remains of the so-called "Pittsburgh Man", unearthed in Pennsylvania, had losted 82 % of the carbon 14 they originally contained. Determine the approximate age of the bones.