MATH 1120   **Quiz 2**   **Summer 2001**

Name : _____

ID : _____

Please show the details of your work !!

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

Domain	$(-\infty, 0) \cup (0, \infty)$
Vertical asymptotes	$x = 0$ and $f(x) \to -\infty$ as $x \to 0^+$ or 0^-
Horizontal asymptotes	$y = 0$
Intervals where f is $\nearrow$ and $\searrow$	$\nearrow$ on $(0, 2)$; $\searrow$ on $(-\infty, 0) \cup (2, \infty)$
Relative extrema	Relative maximum at $(2, 9)$
Concavity	Downward on $(-\infty, 0) \cup (0, 3)$; upward on $(3, \infty)$
Points of inflection	$(3, 8)$

2. Let $f(x) = x^4 - 2x^3 + 6$.

    (a) Find the interval(s) where $f(x)$ is concave upward and the interval(s) on which it is concave downward.

    (b) Find the inflection points, if any.

3. Let $f(x) = \frac{x}{x^2+1}$.

    (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 of the function, if any.

4. Find the absolute maximum and the absolute minimum of $f(x) = x^{2/3} + 4$ on [-1,8].

5. By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps, an open box may be made. If the cardboard is 45 inches long and 24 inches wide, find the dimensions of the box that will yield the maximum volume.