

MATH 1120

Test 2

Summer 2001

Name : _____

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ID : _____

1. Let $f(x) = 2x^3 + 6x^2 - 18x - 1$.

(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, if any.

2. Find the absolute maximum and the absolute minimum of

$$f(x) = 6 - (x + 1)^{2/3}$$

on the interval $[-2, 7]$.

3. Find the horizontal and vertical asymptotes of the graph of the function $f(x) = \frac{x-2}{2x+3}$. (You need not sketch the graph.)

4. 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 32 inches long and 20 inches wide, find the dimensions of the box that will yield the maximum volume.

5. Solve the equations for x :

(a) $3^x = 9^{x-3}$

(b) $3e^{2x} = 20$

6. Find the derivatives of the following functions

(a) $e^{3x} + \ln x$

(b) $\ln(x^2 + 4)$

(c) $x^3 e^{x^3}$

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

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

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

7. Suppose that a tree died at time $t = 0$. In this case the amount of carbon 14 present in its wood deposits at any time t obeys the law $Q(t) = Q_0 e^{-0.00012t}$. Wood deposits recovered from an archeological site contain 15% of the carbon 14 they originally contained. How long ago did the tree from which the wood was obtained die?