MATH 131

Quiz 7

November 7, 1997

slightly long

allowed 26

test @ 1B

25 | 27 28 29 29 29 32 ...

Name Key

$\bar{X} = 23.9/30$

$m = 24$

1. Find the following limits (show work):

a. $\lim_{x\to\infty} \dfrac{3x^3 - 6x}{2x^2 + 5} = \lim_{x\to\infty} \dfrac{3x - \frac{6}{x}}{2 + 5/x^2} = \infty$

mean x^3

b. $\lim_{x\to\infty} \dfrac{x - 3}{x^4 - x + 2} = \lim_{x\to\infty} \dfrac{\frac{1}{x^3} - \frac{3}{x^4}}{1 - \frac{1}{x^3} + \frac{2}{x^4}} = \frac{0}{1} = 0$

8

2. Find the following antiderivatives:

a. $\int x^3 + \sin x \, dx = \dfrac{x^4}{4} - \cos x + c$

b. $\int \sqrt{2x - 5} \, dx = \int (2x-5)^{1/2} dx = \dfrac{(2x-5)^{3/2}}{2 \cdot 3/2} + c = \dfrac{(2x-5)^{3/2}}{3} + c$

4

3. If $dy/dx = x^2 + 1$ and $y = 2$ when $x = 1$, then find y.

$y = \frac{x^3}{3} + x + c$

$2 = \frac{1}{3} + 1 + c$

$C = \frac{2}{3}$

$y = \frac{x^3}{3} + x + \frac{2}{3}$

10

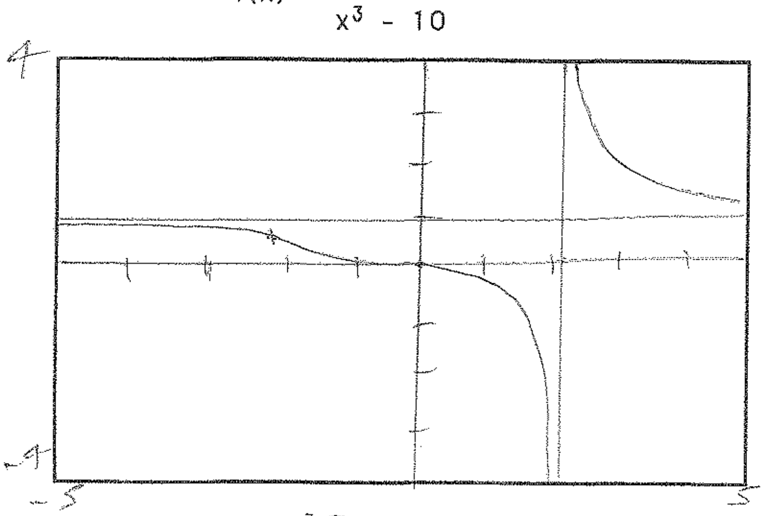
4. Sketch the graph of the following function. Select an appropriate window, and give the ranges. Give (if any): and what no graph

a. Coordinates of local maxima, minima; global local maxima, minima, inflection points.

b. Intervals on which the function is increasing, decreasing, concave up, down.

c. Equations of asymptotes and plot.

$$f(x) = \frac{x^3}{x^3 - 10}$$



$f'(x) = \dfrac{(x^3-10)3x^2 - x^3(3x^2)}{(x^3-10)^2}$

$= \dfrac{3x^2[x^3-10 - x^3]}{(x^3-10)^2}$

$= \dfrac{-30x^2}{(x^3-10)^2}$

C.P. $x = 0$ (90)

$f''(x) = \dfrac{(x^3-10)^2(-60x) - (-30x^2)\,2(x^3-10)(3x^2)}{(x^3-10)^4}$

$= \dfrac{60x(x^3-10)\left[-(x^3-10) + 3x^3\right]}{(x^3-10)^4}$

$= \dfrac{60x(x^3-10)(2x^3+10)}{(x^3-10)^4}$

$x = \sqrt[3]{10}, 0, \sqrt[3]{-5}$

2.15   -2.15   -1.71

c. V.A. $x = \sqrt[3]{10}$

H.A. $\lim_{x\to\infty} \dfrac{x^3}{x^3-10} = \lim_{x\to\infty} \dfrac{1}{1 - 10/x^3} = 1$

$y = 1$

a. no max min   PI $-\sqrt[3]{10}, 0$

b. I none D $(-\infty, \sqrt[3]{10}), (\sqrt[3]{10}, \infty)$

CC ↑ $(-\sqrt[3]{10}, 0)\ (\sqrt[3]{10}, \infty)$

CC ↓ $(-\infty, -\sqrt[3]{10}), (0, \sqrt[3]{10})$