

Math 1303 Practice Exam 2

Evaluate the following limits:

$$\lim_{x \rightarrow 0} \frac{x-3}{x^2+1}$$

$$\lim_{x \rightarrow 2} \frac{2-x}{x^2}$$

$$\lim_{x \rightarrow 1} \frac{x-5x+6}{x-2}$$

$$\lim_{x \rightarrow 2} \frac{x-5x+6}{x-2}$$

$$\lim_{x \rightarrow 3} \frac{x^2-9}{x-3}$$

$$\lim_{x \rightarrow 4} \frac{x^2-16}{x^2-x-12}$$

$$\lim_{x \rightarrow \infty} \frac{2-x}{x^2+9}$$

$$\lim_{x \rightarrow \infty} \frac{3x^2-2x+7}{3-2x^2}$$

$$\lim_{x \rightarrow -\infty} \frac{2+3x^3}{x^2+x+1}$$

Let $f(x) = \begin{cases} x^2 & \text{for } x > 0 \\ 1 & \text{for } x = 0 \\ 3x-1 & \text{for } x < 0 \end{cases}$ Find the limits $\lim_{x \rightarrow -\infty} f(x)$, $\lim_{x \rightarrow 0^-} f(x)$, $\lim_{x \rightarrow 0^+} f(x)$, $\lim_{x \rightarrow 0} f(x)$

Let $f(x) = \begin{cases} 2x-5 & , x < 2 \\ -x & , x \geq 2 \end{cases}$ Is $f(x)$ is continuous at $x = 0$? How about at $x = 2$?

Let $f(x) = \begin{cases} \frac{x^2-9}{x-3} & \text{if } x \neq 3 \\ 6 & \text{if } x = 3 \end{cases}$ Is $f(x)$ is continuous at $x = 0$? How about at $x = 3$?

Using the definition of the derivative, find

$f'(x)$ if $f(x) = -x^2 + 5x + 2$. Then find the equation of the tangent line to $f(x)$ at $x = 3$

$f'(x)$ if $f(x) = x^2 - 6x + 3$. Then find the equation of the tangent to $f(x)$ at $x = 2$

Differentiate and simplify

$$y = -3x^5 - 13$$

$$f(t) = \frac{4}{t} + \frac{t}{4} + \sqrt[5]{t^2}$$

More to come

Consider the function $y = 2x^3 + 3x^2 - 12x - 3$. Identify all critical points. State the intervals over which the graph is increasing, decreasing. Identify any absolute or relative extrema. Do the same for $y = x^3 - 9x^2 + 15x - 4$.

A supermarket manager wants to establish an inventory policy for frozen orange juice. He finds that his inventory costs each month are $C(x) = \frac{360000}{x} + 4x$ dollars, where x is the number of cases of orange juice. How many cases should he order each month to minimize his inventory costs?

The analysis of the daily output of a factory assembly line shows that about $H(t) = 60t + t^2 - t^3$ units are produced after t hours of work. The factory currently operates 4 hours a day but management is thinking about operating it a little longer. Would the output increase or decrease?

The Consumer Price Index (CPI) of an economy is described by the function $I(t) = 200 + 3t - 0.4t^2$, where t is time in years and $t = 0$ corresponds to the year 2004. Will the CPI increase in 2010?

Suppose the cost function of making q throw rugs is $C = 4q^2 - 2\sqrt{q^3} + 4400$. Find the marginal cost function as well as the marginal cost for $q = 3$. What does that mean? Find the fixed cost. What does *that* mean?

Suppose the cost for producing q items is $C(q) = 6q^3 - 320q + 1700$. Find the marginal cost function as well as the marginal cost for $q = 2$. What does that mean? Find the fixed cost. What does *that* mean?