Brief Article

The Author

November 3, 2004

Math 119: Calculus Name:____________________________ **Exam I** Tutorial

Instructor:____________________________ *September 26, 1995* Tutorial

Section:____________________________

Calculators are not allowed. Hand in this answer page only. Record your answers to the multiple choice problems by placing an $\times$ through one letter for each problem on this answer sheet. There are 19 multiple choice questions, worth 5 points each. An additional 5 points will be given for your correct tutorial section number.

You are taking this exam under the honor code.

Let L be the line through the points $(2, 3)$ and $(4, 6)$. Find the equation of the line that is perpendicular to L and whose y-intercept is 7.

$2x + 3y = 21$

$-2x + 3y = 21$

$2x - 3y = 21$

$3x - 2y = 14$

$2x + 3y = 13$

Find $\sin(\frac{-7\pi}{6})$.

$\frac{1}{2}$

$-\frac{1}{2}$

$\frac{\sqrt{3}}{2}$

$-\frac{\sqrt{3}}{2}$

$-\frac{\sqrt{2}}{2}$

Find the domain of the function

$$f(x) = \sqrt{\frac{x}{x-1}}$$

(Recall that $A \cup B$ means all x which are either in A or in B or both.)

$(-\infty, 0] \cup (1, +\infty)$ $(-\infty, 0) \cup (1, +\infty)$ $(0, 1)$ $[0, 1)$ all $x \neq 1$

The following equation is that of a circle. Find its center and radius.

$$x^2 + y^2 - 6x + 2y + 6 = 0$$

center $(3, -1)$, radius 2 center $(-3, 1)$, radius 2 center $(-3, 1)$, radius 4 center $(3, -1)$, radius 4 center $(3, 1)$, radius 2

If a ball is thrown into the air with a velocity of 64 ft/sec, its height in feet after t seconds is given by $y = 64t - 16t^2$. Find the average velocity of the ball for the first second of flight (i.e. from $t = 0$ to $t = 1$).

48 ft/sec 32 ft/sec 64 ft/sec 16 ft/sec 0 ft/sec

Let

$$f(x) = \begin{cases} x^2 + 1 & \text{if } x < 1; \\ 6 & \text{if } x = 1; \\ 3x - 1 & \text{if } x > 1. \end{cases}$$

Find $\lim_{x \to 1} f(x)$, if it exists.

2 does not exist 5 6 1

Find $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$, if it exists.

2 0 1 does not exist -2

Find $\lim_{x \to 0^-} \frac{|x|}{x}$, if it exists.

-1 1 0 does not exist π

Let $f(x)$ be a function. Consider the following four limits:

I. $\lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$ II. $\lim_{x \to a} \frac{f(x) - f(a)}{x - a}$

III. $f'(a)$ IV. $\lim_{h \to 0} \frac{f(h) - f(a)}{a}$

Which of these limits represent(s) the slope of the tangent line to the graph of $y = f(x)$ at the point $(a, f(a))$?

only I., II. and III. they all do only I. and III. only III. only I. and II.

Recall our notation that "$|AB|$" is the length of the straight line segment joining A to B, and "arc AB" is the length of the arc joining A to B. In the following diagram, the radius of the circle is 1 (i.e. $|OA| = |OB| = 1$) and the line segment BD is tangent to the circle.

Which of the following is equal to $\tan\theta$?

$|BD|$ arc AB $|AB|$ $|AC|$ $|OC|$

Find $\lim_{x\to 0} \dfrac{\sin 3x}{\sin 4x}$.

$\frac{3}{4}$ $\frac{4}{3}$ 1 does not exist 0

Find $\lim_{x\to 0} \dfrac{x^2}{\sin 5x}$. (Hint: $x^2 = x \cdot x$.)

0 $\frac{1}{5}$ 1 does not exist $\frac{2}{5}$

Find the derivative of $f(x) = \dfrac{x^2+1}{x^2-1}$

$\dfrac{-4x}{(x^2-1)^2}$ $\dfrac{-4x^3}{(x^2-1)^2}$ $\dfrac{4x^3-4x}{(x^2-1)^2}$ $\dfrac{4x}{(x^2-1)^2}$ $\dfrac{4x^3}{(x^2-1)^2}$

Find the derivative of $f(x) = \dfrac{1}{\sqrt{x}}$

$\frac{-1}{2\sqrt{x^3}}$ $\frac{1}{2\sqrt{x^3}}$ $\frac{-2}{\sqrt{x^3}}$ $\frac{2}{\sqrt{x^3}}$ $\frac{2}{\sqrt{x}}$

Consider the following equations and inequalities:

I. $\frac{\sin\theta}{\theta} = 1$ II. $\sin^2\theta + \cos^2\theta = 1$ III. $-1 \le \tan\theta \le 1$

Which of them is/are true for *all* values of θ?

Only II. I., II. and III. II. and III. I. and II. I. and III.

Let

$$f(x) = \begin{cases} 3 & \text{if } x \le -1; \\ x & \text{if } -1 < x < 1; \\ \frac{1}{\sqrt{x}} & \text{if } x \ge 1. \end{cases}$$

Find all values of x at which $f(x)$ is not continuous.

$x = -1$ $x = -1$ and $x = 1$ $x = -1$ and $x = 0$ $x = -1$, $x = 0$ and $x = 1$ $x = 1$

The following limit represents the derivative of some function $f(x)$ at some number a:

$$\lim_{h \to 0} \frac{\sqrt{4+h} - 2}{h}$$

Find f and a.

$f(x) = \sqrt{x}$, $a = 4$ $f(x) = \sqrt{4+x}$, $a = 4$ $f(x) = \sqrt{x}$, $a = 2$ $f(x) = \sqrt{4+x}$, $a = 2$ $f(x) = \sqrt{x}$, $a = 0$

What is the distance between the points $(-1, -2)$ and $(3, 4)$?

$\sqrt{52}$ $\frac{6}{4}$ $\sqrt{8}$ 52 $\sqrt{10}$

Find the equation of the tangent line to the curve $y = x^3 - 5$ at the point $(2, 3)$.

$y - 3 = 12(x - 2)$ $y - 3 = 11(x - 2)$ $y - 2 = 12(x - 3)$ $y - 2 = 11(x - 3)$ $y - 3 = 27(x - 2)$