Brief Article

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Math 119: Calculus Name:______________________________ **Exam II**

Instructor:______________________________ *October 29, 1996* Time of MWF

class:______________________________

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 20 multiple choice questions, worth 5 points each.

You are taking this exam under the honor code.

Let

$$f(x) = \begin{cases} x^2+1, & \text{if } x<0; \\ 3, & \text{if } x=0; \\ 2x+3, & \text{if } x>0. \end{cases}$$

Which of the following is true: $f(x)$ is continuous from the right but not from the left, at $x=0$. $f(x)$ is continuous from the left but not from the right, at $x=0$. $f(x)$ is continuous at $x=0$. $f(x)$ is neither continuous from the left nor from the right, at $x=0$. $f(x)$ is undefined at $x=0$.

Convert $\dfrac{13\pi}{6}$ from radians to degrees.

390° 420° 330° 300° 360°

Find all values of x in the interval $[0,2\pi]$ that satisfy the equation

$$2\sin x = \tan x$$

$x=0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}, 2\pi$ $x=0, \frac{\pi}{6}, \pi, \frac{11\pi}{6}, 2\pi$ $x=0, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, 2\pi$ $x=0, \frac{5\pi}{6}, \pi, \frac{7\pi}{6}, 2\pi$ $x=0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

Find $\lim\limits_{x\to 0} \dfrac{\sin^2 5x}{x^2}$, if it exists.

25 5 1 it does not exist 0

Find $\frac{dy}{dx}$ if $y = \frac{\sin x}{x}$

$\frac{x\cos x - \sin x}{x^2}$ 1 $\cos x$ $\frac{x\sin x - \cos x}{x^2}$ $\frac{\sin x - \cos x}{x^2}$

If $f(x) = \sin^2(x^2+1)$, find $f'(x)$.

$4x\sin(x^2+1)\cos(x^2+1)$ $4x\sin(x^2+1)$ $4x\cos(x^2+1)$ $2\sin(x^2+1)$ $2\sin(x^2+1)\cos(x^2+1)$

If $f(x) = \tan^2 x$, it can be shown that $f'(x) = 2\frac{\sin x}{\cos^3 x}$ (you don't have to verify this). Find the equation of the tangent line to the graph of $y = \tan^2 x$ at $x = \frac{\pi}{3}$.

$y - 3 = 8\sqrt{3}\left(x - \frac{\pi}{3}\right)$ $y - \frac{1}{3} = 8\sqrt{3}\left(x - \frac{\pi}{3}\right)$ $y - 3 = \frac{\sqrt{3}}{8}\left(x - \frac{\pi}{3}\right)$ $y - \frac{1}{3} = \frac{\sqrt{3}}{8}\left(x - \frac{\pi}{3}\right)$ the graph has no tangent line at $x = \frac{\pi}{3}$

Suppose that $F(x) = f(g(x))$ and suppose that you have the following information:

$$f(2) = 7 \quad f(4) = 6 \quad g(2) = 4 \quad g(4) = 6$$

$$f'(2) = -3 \quad f'(4) = 5 \quad g'(2) = 3 \quad g'(4) = -2$$

Find $F'(2)$.

15 -10 -9 -12 21

Use implicit differentiation to find $\frac{dy}{dx}$ if $x^2 + xy + y^3 = 3$.

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

For what value of c is the following function continuous?

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

$c = -4$ $c = 2$ $c = 3$ $c = -3$ $c = 0$

Find a second-degree polynomial $P(x)$ such that $P(1) = 2$, $P'(1) = 5$, and $P''(1) = 8$. (Recall that a second degree polynomial is one of the form $ax^2 + bx + c$ for some constants a, b and c.) Once you've found this polynomial, find $P(0)$.

1 0 2 8 5

Let $f(x) = \sqrt{3x+1}$. Find $f''(x)$.

$-\frac{9}{4} \cdot \frac{1}{(3x+1)^{3/2}}$ $-\frac{1}{4} \cdot \frac{1}{(3x+1)^{3/2}}$ $-\frac{3}{(3x+1)^2}$ $-\frac{9}{4} \cdot \frac{1}{\sqrt{3x+1}}$ $-\frac{1}{4} \cdot \frac{1}{\sqrt{3x+1}}$

Car A is moving east at 40 mph, while Car B is moving south at 30 mph. At noon, Car A is 3 miles east of point P, while Car B is 4 miles north of point P. (See diagram.) Which of the following is true about the distance between Car A and Car B at noon?

the distance is not changing the distance is increasing by 5 mph the distance is decreasing by 5 mph the distance is increasing by 10 mph the distance is decreasing by 10 mph

The equation of motion for a certain particle moving along a straight line is given by $s = 2t^3 - 4t^2 + 3t - 5$ (where s is in meters and t is in seconds). Find the acceleration after 1 second.

4 m/sec^2 -8 m/sec^2 8 m/sec^2 0 m/sec^2 6 m/sec^2

A balloon is constructed in the shape of a perfect cube, for a parade. It is being inflated at a rate of 36 ft^3/min, always maintaining the shape of a cube. How quickly is the side of the balloon growing at the instant when the side is 2 ft. long?

3 ft/min 1 ft/min 2 ft/min 4 ft/min 5 ft/min

Find $\lim_{t \to 0} \frac{\cos t - 1}{\sin 2t}$, if it exists.

0 1 the limit does not exist $\frac{1}{2}$ 2

Find the slope of the tangent line to the curve $y^2 - 6x^2 = 1$ at the point $(2, 5)$.

$\frac{12}{5}$ $\frac{2}{5}$ $\frac{24}{5}$ 0 3

If a ball is thrown vertically upward from the top of a 48-foot tower with a velocity of 32 ft/sec, its height after t seconds is $s = -16t^2 + 32t + 48$. What is its velocity as it hits the ground?

-64 ft/sec -32 ft/sec -16 ft/sec -48 ft/sec -80 ft/sec

Of the five expressions listed below, which one is equal to $\sec x - \cos x$?

$\tan x \sin x$ $\tan^2 x$ $\cos^2 x$ $\sin^2 x$ 0

Find the third derivative, $f^{(3)}(x)$, of $f(x) = \sin 2x$.

$-8\cos 2x$ $8\cos 2x$ $-\cos 2x$ $\cos 2x$ $-2\cos 2x$