Brief Article

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Math 119: Calculus Name:_____ **Exam II** Tutorial

Instructor:_____ *November 1, 1994* 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.

Find $\dfrac{d}{dx}\left(\dfrac{\sin x + 1}{\cos x + 1}\right)$ (Hint: remember that $\sin^2 x + \cos^2 x = 1$.) $\dfrac{1 + \sin x + \cos x}{(\cos x + 1)^2}$ $\sec^2(x+1)$ $\sec^2 x$ $\dfrac{1}{(\cos x + 1)^2}$ 0

Find the slope of the tangent line to the curve $y = \cos 3x$ at the point $\left(\dfrac{\pi}{4}, -\dfrac{\sqrt{2}}{2}\right)$. $-\dfrac{3\sqrt{2}}{2}$ $\dfrac{3\sqrt{2}}{2}$ -3 3 $-\dfrac{1}{2}$

Find $f'(x)$ if $f(x) = (1+2x)^3$. $f'(x) = 6(1+2x)^2$ $f'(x) = 12(1+2x)^2$ $f'(x) = 24(1+2x)^2$ $f'(x) = 3(1+2x)^2$ $f'(x) = (1+2x)^2$

Find $\dfrac{dy}{dx}$ by implicit differentiation:

$$x^2 + xy^2 + y^3 = 1$$

$\dfrac{dy}{dx} = \dfrac{-2x - y^2}{2xy + 3y^2}$ $\dfrac{dy}{dx} = \dfrac{1 - 2x - y^2}{2xy + 3y^2}$ $\dfrac{dy}{dx} = \dfrac{-2x - y^2 - 2xy}{3y^2}$ $\dfrac{dy}{dx} = \dfrac{-2x - 2xy}{3y^2}$ $\dfrac{dy}{dx} = \dfrac{1 - 2x - 2xy}{3y^2}$

Find the slope of the tangent line to the following curve at the given point:

$$x^2 - y^2 = 3, \quad (2, 1)$$

$2\ \frac{1}{2}\ -\frac{1}{2}\ -2\ \frac{3}{2}$

Find the second derivative of the function $f(x) = \tan x$. $2\sec^2 x \tan x$ $2\sec x$ $-2\sec x \tan x$ $-2\sec x$ $2\sec x \tan x$

A particle moves along a straight line, with equation of motion given by $s = t^3 - 12t$, with $t \geq 0$. Find the acceleration at the instant when the velocity is 0. 12 −12 24 $\sqrt{12}$ 0

A square with side x and area A is growing with respect to time t in such a way that x grows at a rate of 3 feet per second. Find $\frac{dA}{dt}$ at the moment when $x = 4$. 24 9 $\frac{16}{9}$ 16 12

If $xy = 1$ and $\frac{dx}{dt} = 4$, find $\frac{dy}{dt}$ when $x = 2$. -1 $-\frac{1}{2}$ $\frac{1}{4}$ -4 $\frac{1}{2}$

Find (all) the critical numbers of the function $f(x) = |x - 1|$. $x = 1$ $x = -1$ $x = 0$ $x = 1$ and $x = -1$ The function has no critical numbers

Find the absolute maximum value (i.e. the y-coordinate) of the function $f(x) = -x^2 + 4x + 1$ on the interval $0 \leq x \leq 3$. 5 2 4 10 3

Find (all of) the critical numbers of the function $f(x) = \sin 2x$ on the interval $0 < x < \pi$. $x = \frac{\pi}{4}, \frac{3\pi}{4}$ $x = \frac{\pi}{2}$ $x = \frac{\pi}{4}$ $x = \frac{\pi}{2}$ The function has no critical numbers on the given interval

Joe and Robin start from the same point, at the same time. Joe walks east at a rate of 4 mph and Robin walks north at a rate of 3 mph. How quickly is the distance between them changing after one hour? 5 mph 10 mph 7 mph 12 mph 15 mph

If $g(t) = t^4 - 4t^2 + 2$, find $g^{(3)}(1)$. (Remember that $f^{(n)}(x)$ is the n-th derivative of $f(x)$.) 24 0 4 -4 -1

Consider the curve $x^2 + 2y^2 = 8$. It is a fact that $\frac{dy}{dx} = -\frac{1}{2} \cdot \frac{x}{y}$. Using this fact, find all the points where the tangent line is horizontal. $(0, 2)$ and $(0, -2)$ $(0, 2)$ $(\sqrt{8}, 0)$ and $(-\sqrt{8}, 0)$ $(0, 0)$ $(\sqrt{8}, 0)$

Find a second degree polynomial $P(x)$ such that $P(0) = 1$, $P'(0) = 3$ and $P''(0) = 4$. (In other words, if $P(x) = ax^2 + bx + c$, this question is asking you to figure out what a, b and c have to be.) $P(x) = 2x^2 + 3x + 1$ $P(x) = 4x^2 + 3x + 1$ $P(x) = x^2 + 3x + 2$ $P(x) = x^2 + 3x + 4$ $P(x) = x^2 + 2x + 3$

If $f(x) = \tan \frac{1}{x}$, find $f'(x)$. $-\left(\frac{1}{x^2}\right)\left(\sec^2 \frac{1}{x}\right)$ $(\tan x)\left(-\frac{1}{x^2}\right) + \left(\frac{1}{x}\right)(\sec^2 x)$ $\left(\frac{1}{x^2}\right)\left(\csc^2 \frac{1}{x}\right)$ $\left(\frac{1}{x^2}\right)\left(\sec^2 \frac{1}{x}\right) - \left(\frac{1}{x^2}\right)\left(\csc^2 \frac{1}{x}\right)$

Let $f(x) = 8x^{\frac{1}{2}} - \frac{2}{3}x^{\frac{3}{2}} + 1$. It is a fact that $f'(x) = \frac{4}{\sqrt{x}} - \sqrt{x}$. Find (all of) the critical numbers

of $f(x)$. $x = 0$ and $x = 4$ $x = 4$ $x = 0$ and $x = 2$ $x = 0$, $x = 2$ and $x = -2$ $x = 0$ and $x = 16$

Let $f(x) = x \sin x$. Find $f'(\pi)$. $-\pi$ 0 π -1 1