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Derivatives of Trigonometric Functions

$$\frac{d}{dx}(\sin x) = \cos x$$

$$\frac{d}{dx}(\cos x) = -\sin x$$

$$\frac{d}{dx}(\tan x) = \sec^2 x$$

$$\frac{d}{dx}(\csc x) = -\csc x \cot x$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x$$

$$\frac{d}{dx}(\cot x) = -\csc^2 x$$

Differentiation: Trigonometry, logarithm, and exponent functions

Find the 1st derivative of each function.

I. Trigonometry:

a) $f(x) = 2x(\cos x)$

b) $y = \tan^4(3 + 4x)$

c) $g(x) = \frac{1 - \sin x}{1 + \sin x}$

II. Logarithms:

a) $y = \ln(x^2)$

b) $h(x) = \frac{\ln x}{x^2}$

c) $f(x) = \ln \sqrt{x^2 - 4}$

III. Exponents:

a) $y = x^2 e^x$

b) $y = 3^{x-1}$

c) $f(x) = 4e^{2x}$

ISSAY

190 Find $\frac{dy}{dx}$ using implicit differentiation for 1-19 odd. Assume all k 's are constants. If you need extra practice (optional) then do the even numbered problems and go to <http://www.ck12.org> to get the answers (type in "implicit differentiation" then your equation and click the "?" sign). (These problems are from Section 3.5)

- | | |
|-------------------------------|--------------------------------|
| 1. $x^2 + y^2 = \sqrt{2}$ | 2. $x^2 + y^2 = 8$ |
| 3. $x^2 + xy - y^2 = xy^2$ | 4. $x^2 + y^2 + 3x - 5y = 25$ |
| 5. $xy + x + y = 5$ | 6. $x^2y - 2y + 5 = 0$ |
| 7. $x^2y^3 - xy = 6$ | 8. $\sqrt{x} = 5\sqrt{y}$ |
| 9. $\sqrt{x} + \sqrt{y} = 25$ | 10. $xy - x - 3y - 4 = 0$ |
| 11. $6x^2 + 4y^2 = 36$ | 12. $xy^2 - 4y^2 = x^2$ |
| 13. $\ln x + \ln(y^2) = 3$ | 14. $x \ln y + y^2 = \ln x$ |
| 15. $\sin(xy) = 2x + 5$ | 16. $e^{xy} = x^2 \sec^2 y$ |
| 17. $\arctan(x^2y) = xy^2$ | 18. $e^x + \ln y = 0$ |
| 19. $(x - a)^2 + y^2 = a^2$ | 20. $e^{xy} + y^{2x} = a^{2x}$ |

191 Find $\frac{dy}{dx}$ using implicit differentiation for 23, 25 and find the slope of the tangent line to the curve of the given point AND go to <http://www.khanacademy.com/math/multivariable-calculus/implicit-differentiation> enter in the implicit equation, copy the graph to your paper and illustrate the slope or tangent line requested on your graph. You can also find the graph of the equation by going to <http://www.wolframalpha.com> and typing in "graph" and then your equation. (These problems are from section 3.5)

23. $\sin(xy) = x$ at $(1, \pi/2)$
 24. $x^2 + 2xy + y^2 = 4$ at $(1, 1)$
 25. $x^2 + 5x^2y + 2y^2 = 4y + 11$ at $(1, 2)$

192-R Read and take notes on Section 3.9

making $A = B$,

$$\sin 2A = 2(\sin A \cos A)$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$\cos 2A = \cos^2 A - \sin^2 A \tag{1}$$

but $\sin^2 A + \cos^2 A = 1$

$$\Rightarrow \cos^2 A = 1 - \sin^2 A$$

$$\Rightarrow \sin^2 A = 1 - \cos^2 A$$

substituting for $\cos^2 A$ in (1)

$$\cos 2A = 1 - \sin^2 A - \sin^2 A$$

$$\cos 2A = 1 - 2\sin^2 A$$

substituting for $\sin^2 A$ in (1)

$$\cos 2A = \cos^2 A - (1 - \cos^2 A)$$

$$\cos 2A = \cos^2 A - 1 + \cos^2 A$$

$$\cos 2A = 2\cos^2 A - 1$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

Exercise 1 Implicit Differentiation: Solutions		
Use implicit differentiation to find $\frac{dy}{dx}$ where		
(a) $xy = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(xy) = \frac{d}{dx}(1)$ Using the product rule: $x \frac{dy}{dx} + 1 \cdot y = 0$ $\frac{dy}{dx} = -\frac{y}{x}$	(b) $x^2y = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(x^2y) = \frac{d}{dx}(1)$ Using the product rule: $x^2 \frac{dy}{dx} + 2x \cdot y = 0$ $\frac{dy}{dx} = -\frac{2y}{x^2}$ $= -\frac{2}{x}$	(c) $e^y = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(e^y) = \frac{d}{dx}(1)$ Using the product rule: $e^y \frac{dy}{dx} + e^y \cdot y = 0$ $\frac{dy}{dx} = -\frac{y e^y}{e^y}$ $= -y$
(d) $x^2y^2 = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(x^2y^2) = \frac{d}{dx}(1)$ Using the product and chain rules: $x \cdot 2y \frac{dy}{dx} + 1 \cdot y^2 = 0$ $\frac{dy}{dx} = -\frac{y^2}{2xy}$ $= -\frac{y}{2x}$	(e) $x^2y^2 = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(x^2y^2) = \frac{d}{dx}(1)$ Using the product and chain rules: $x^2 \cdot 2y \frac{dy}{dx} + 2x \cdot y^2 = 0$ $\frac{dy}{dx} = -\frac{2xy^2}{2x^2y}$ $= -\frac{y}{x}$	(f) $e^{y^2} = 1$ Differentiating both sides with respect to x : $\frac{d}{dx}(e^{y^2}) = \frac{d}{dx}(1)$ Using the product and chain rules: $e^y \cdot 2y \frac{dy}{dx} + e^y \cdot y^2 = 0$ $\frac{dy}{dx} = -\frac{y^2 e^y}{2y e^y}$ $= -\frac{y}{2}$
Note: (a) could be done by rearranging first to $y = 1/x$ and then differentiating	Note: (b) could be done by rearranging first to $y = 1/x^2$ and then differentiating	Note: (c) could be done by rearranging first to $y = e^{-1}$ and then differentiating

Differentiation rules worksheet with answers. Worksheet 2.3 differentiation rules. Basic differentiation rules worksheet. Basic differentiation rules worksheet pdf. Differentiation rules worksheet pdf.

But you have to do it in a way that's true to yourself. No one is advocating breaking the law or acting unethically. The composite functions include polynomials, rational, radicals, trig and inverse trig, exponential and logarithmic expressions. All of our Roman Numeral charts coLimit & Alternate Definition of a Derivativeby This activity worksheet is a scaffolded approach to assisting students evaluate derivatives at a point when given the limit or alternate definition of a derivative. This resource contains total of 20 problems. After careful consideration and ensuring her marketing efforts were distinctly different from each other, she chose the latter. Now, the partying segment makes up 30% of her growing business and has led to alcohol companies buying her product to emblazon with her logo, while still maintaining healthy sales as a childrene's product. The Break Aligns With Your ValuesOf course, no one is advocating breaking the law, but Austin says there's another guiding principle that should govern your rule-breaking; your gut. Consider whether you're willing to take responsibility for what happens if things don't go as planned. In the United States, we have a lot of attitude to break the rules because our whole government was founded on rule breaking back in the mid-1700s. The worksheet contains 5 problems in the limit definition of a derivative format and 5 problems in the alternate definition of a derivative. Page 2A review of derivatives in the AP Calculus AB/BC course: average rate of change, definition of the derivative, equation of a tangent line, differentiability, derivatives of basic functions, product rule, quotient rule, chain rule, and derivatives of inverse functions. Being reckless when it comes to industry requirements can get you into very hot water, especially in tightly regulated industries. But don't hurt other people. This is a self-checking exercise with guided notes at the top A response sheet is also included. Easel Digital Activity Available: If you decide to use this version of the resource, Instructions Roman Numbers Chart: 1-100, Chart Only (no rules) If you are looking to learn to read, write or teach Roman Numbers, you need a makeup sheet, you want to write a year of birth of fantasy, or know which super bowl is Which one, our printable Roman Numeral Graphics will get you working with this ancient numbering system in no time. When you have experience and knowledge, it's easier to see which rules are worth breaking, and how they can improve the overall environment. You've calculated the risk After Los Angeles-based inventor and speaker Julie Austin developed Swiggies, water bottles that attach to the wrists, a large proportion of her clientele included parents who buy Swiggies for their children. If you're in a tough situation with an angry client, then it might make sense to do what you need to do to fix the situation and save a valuable relationship, he says. Krugel says that you need to be familiar with the laws and regulations of the industry before you get too far ahead of yourself in breaking the rules. Don't try to be something you're not. Attorney Charles A. based in Chicago. What is the potential disadvantage of your action, such as loss of revenue, relapses with employees, or other potential losses? If a rule tells you to do something that's against your ethics or morals, or if breaking the rule violates it, then act accordingly, it says. "You stand out by breaking the rules with your business doing things no one else will do", she says. Besides hurting yourself, don't hurt others. Students will practice differentiation using the chain rule. In addition, contravening industry standards by cutting corners can hurt. Araf ortla nussen ehc eraf- sennisub ortsov li noc eloger el odnegnarfni onougnitsid iS.adneiza artsov allus itnatsavad itteffe Derivatives - Using Power Ruleby A derivative worksheet of resolution and correspondence showing how to differentiate using the power rule. While the children's market was turned out to be a good market, Austin also noticed the running clubs and twentysomethings were also using Swiggies to hold boozy drinks during fun rides or parties. In the United States, we have a lot of attitude to break the rules because our entire government was founded on violating the rules in 1700. But even in morally sound situations, you have to think about the consequences of your actions and be prepared to own them, whether they go the way you wanted or not, he says. A is rooted in us to go against the tide. Austin says he had a choice: She could abide by the rules that prevented her pursue both markets for fear of parents. McMillion, a West Point graduate and two-time combat veteran, takes to break the rules lightly. But your experience can't replace the protocol that comes in way of progress. This document has 15 different No one likes to be thought of as a conformist who's afraid to take the risk and break the rules every now and then. But to break the rules for the sake of doing so without at least a good understanding of what's at risk may lead to wrong decisions and deplorable consequences. Whether we like it or not, there are some rules we should go for it and when you should touch the line. Before being a maverick, make sure the situation fits these criteria: You know enough to make a good break When you know enough to realize that the rules are bogging productivity, it's often a good time to break them, says Mark McMillion, founder of Clarksburg, McMillion Leadership Associates Headquarters in West Virginia, a managerial consulting company. The package has 2 worksheets of 10 derivative problems. 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