

Exam 2 Calc 1 10/15/2015

Each problem is worth 10 points. For full credit provide complete justification for your answers.

1. State the formal definition of the derivative of a function $f(x)$.

2. If $g(x) = \tan x + \arcsin x + x^3 + e^x + 7$, find $g'(x)$.

3. Use the definition of the derivative to find the derivative of $f(x) = x^2$.

4. Show that the derivative of $f(x) = k$ is $f'(x) = 0$.

5. Use the definition of the derivative to find the derivative of $f(x) = \sin x$.

6. State and prove the Product Rule for derivatives. Make it clear how you use any assumptions.

7. Biff is a calculus student at Enormous State University, and he's having some trouble. Biff says "Crap. This Calculus stuff is pretty rough. So, like, the product rule I did okay, but now we're doing the chain rule and I'm pretty mixed up. Our professor was going on and on about how you've gotta know if it's f of g or g of f . But I was thinking it didn't even matter, since, like, if it's sine of x squared, that's the same whether you do the square and then sine or other way around. Like, with 0, sine 0 is 0, then square and it's 0, so it doesn't matter, right?"

Help Biff by explaining as clearly as you can whether his reasoning holds, or if there are limitations

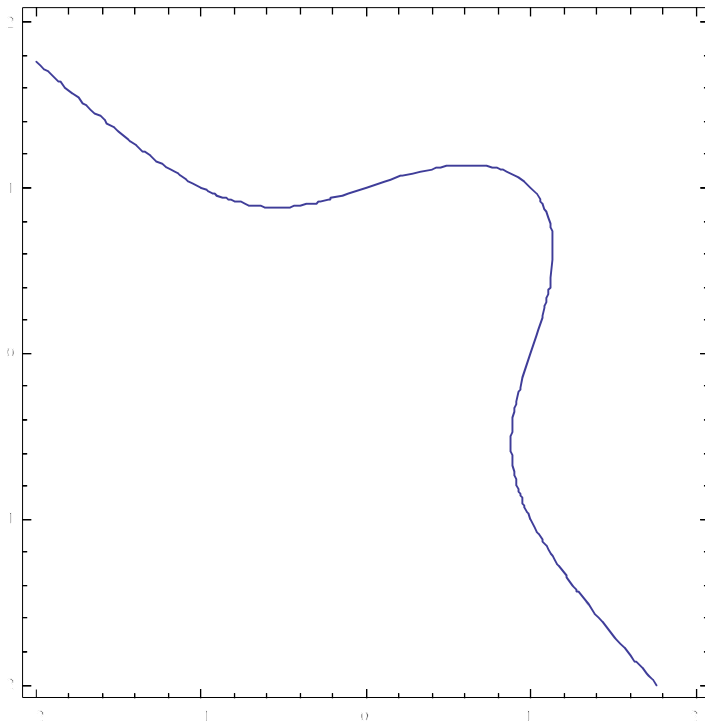
8. Show why the derivative of $y = \ln x$ is $y' = 1/x$.

9. a) What is the derivative of $\arcsin x$?

b) Show why.

10. a) Find the derivative with respect to x of the curve $x^3 + y^3 = xy + 1$.

b) Write an equation for the line tangent to the curve from part a at the point $(1, -1)$.



Extra Credit (5 points possible): Let $f(x) = x^x$. What's $f'(x)$?