

We are lean, mean, derivative machines: _____

Find the derivatives of the following functions. Please show all work and use standard mathematical notation. If you are using the Chain Rule, then clearly state what you are using for your u and your $\frac{du}{dx}$. If you need to simplify first, then clearly show your simplification.

Unless otherwise specified, find $f'(x)$

[2009derivativeproject.doc]

1. $g(x) = f(3x^2)$ find $g'(x)$

2. $f(x) = \sin^2(2x)$

3. $f(x) = \sin(2x^2)$

4. $f(x) = \frac{1}{x^2} - \sqrt[3]{x} + \frac{3x^7}{5}$

5. $f(x) = \sec x \tan x - \cos(2x)$

6. $f(x) = (9x - 5)^7$

7. $g(x) = \sqrt{f(x)}$, find $g'(x)$

8. $f(x) = \frac{3x^2 - 3}{x^2}$

9. $f(x) = \frac{6x - 5}{5x - 6}$

10. $f(x) = \frac{1}{\sqrt{x^4 + 3}}$

11. $h(x) = f^2(x)g(x)$ find $h'(x)$

12. $f(x) = \frac{\cos x}{x^6}$

13. $f(x) = \sqrt[3]{x}(x^6 + x)$

14. Find $\frac{dy}{dx}$ if $\tan(xy) - x = 0$

15. Consider the curve given by $x y^2 - x^3 y = 6$

[2000AB5]

(a) Show that $\frac{dy}{dx} = \frac{3x^2 y - y^2}{2xy - x^3}$

(b) Find the x -coordinate of each point on the curve where the tangent line is vertical

(c) Find all points on the curve whose x -coordinate is 1, and write an equation for the tangent line at each of these points.