Test on derivatives **Name**_____

Take the derivate for the functions in each section.

Do **any four** from this section, only four shall be graded!

1. $y = \frac{x^6}{4} - \frac{x^3}{5} + 9x - 5$ 1._____

$y = \frac{1}{4}x - \frac{1}{5}x^3 + 9x - 5$

$y' = \frac{3}{2}x^2 - \frac{3}{5}x^2 + 9$

2. $f(x) = (x^4 - 8x)^7$ 2._____

$f'(x) = 7(x^4 - 8x)^6 (4x^3 - 8)$

$f'(x) = 28(x^4 - 8x)^6 (x^3 - 2)$

3. $g(x) = \frac{1}{\sqrt{2x^3 + 7}}$ 3._____

$g(x) = (2x^3 + 7)^{-1/2}$

$g'(x) = -1/2(2x^3 + 7)^{-3/2}(6x^2)$

$= \frac{-3x^2}{(2x^3 + 7)^{3/2}}$

4. $y = \frac{10x^7 - 15x^4}{5x^2}$ 4._____

$y = 2x^5 - 3x^2$

$y' = 10x^4 - 6x$

5. $f(x) = \frac{3}{x^3} - \frac{8}{x^5} + 11$ 5._____

$f(x) = 3x^{-3} - 8x^{-5} + 11$

$f'(x) = -9x^{-4} + 40x^{-6}$

$f'(x) = \frac{-9}{x^4} + \frac{40}{x^6}$

Do **any three** from this section, only three shall be graded!

A. $y = (3x^2+5)^6 \cdot (2x^2-7)^{11}$ A._____

answer as a series of products

$y' = (3x^2+5)^6 \cdot 11(2x^2-7)^{10} \cdot 4x + (2x^2-7)^{11} \cdot 6(3x^2+5)^5 \cdot 6x$

$y' = 4x(3x^2+5)^5(2x^2-7)^{10}[11(3x^2+5) + 9(2x^2-7)]$

$y' = 4x(3x^2+5)^5(2x^2-7)^{10}(51x^2-8)$

B. $g(x) = (4x-3)^4 \sin(5x)$ B._____

answer as a series of products

$g'(x) = (4x-3)^4 \cos(5x) \cdot 5 + \sin(5x) \cdot 4(4x-3)^3 \cdot 4$

$g'(x) = (4x-3)^3[5\cos(5x)(4x-3) + 16(\sin(5x))]$

$g'(x) = (4x-3)^3[5(4x-3)\cos(5x) + 16\sin(5x)]$

C. $y = (9x-11)^{15} \cdot (4x+5)^{27}$ C._____

answer as a series of products

$y' = (9x-11)^{15} \cdot 27(4x+5)^{26} \cdot 4 + (4x+5)^{27} \cdot 15(9x-11)^{14} \cdot 9$

$y' = 27(9x-11)^{14}(4x+5)^{26}[4(9x-11) + 5(4x+5)]$

$y' = 27(9x-11)^{14}(4x+5)^{26}(56x-19)$

D. $f(x) = \sin(5x^2) \cdot \sin^3(2x)$ D._____

answer as a series of products

$f'(x) = \sin(5x^2) \cdot 3[\sin(2x)]^2 \cdot \cos(2x) \cdot 2 + \sin^3(2x) \cdot \cos(5x^2) \cdot 10x$

$= 2\sin^2(2x)[3\sin(5x^2)\cos(2x) + 5x\sin(2x)\cos(5x^2)]$

Do **both** from this section!

6. $y = \dfrac{(3x-4)^5}{(x+9)^7}$ 6._____

$y' = \dfrac{(x+9)^7 \cdot 5(3x-4)^4 \cdot 3 - (3x-4)^5 \cdot 7(x+9)^6}{(x+9)^{14}}$

$\dfrac{(x+9)^6(3x-4)^4[15(x+9) - 7(3x-4)]}{(x+9)^{14}}$

$\dfrac{(3x-4)^4(-6x+163)}{(x+9)^8}$

7. $f(t) = \dfrac{11t^2-5}{6t+1}$ 7._____

$f'(t) = \dfrac{(6t+1)\cdot 22t - (11t^2-5)\cdot 6}{(6t+1)^2}$

$= \dfrac{66t^2+22t+30}{(6t+1)^2}$

$= \dfrac{2(33t^2+11t+15)}{(6t+1)^2}$

Do **any four** from this section, only four shall be graded!

E. $g(t) = \dfrac{9t}{\sqrt[3]{(4t^2+1)^2}} = 9t(4t^2+1)^{-2/3}$ E._____

$g'(t) = 9t \cdot -\frac{2}{3}(4t^2+1)^{-5/3} \cdot 8t + (4t^2+1)^{-2/3} \cdot 9$

$= \dfrac{-48t^2}{(4t^2+1)^{5/3}} + \dfrac{9(4t^2+1)}{(4t^2+1)^{2/3}(4t^2+1)} = \dfrac{-12t^2+9}{(4t^2+1)^{5/3}}$

F. $f(x) = \sec^4\sqrt{8x-3}$ F._____

$f'(x) = 4\left[\sec(8x-3)^{1/2}\right]^3 \cdot \sec(8x-3)^{1/2} \cdot \tan(8x-3)^{1/2} \cdot \frac{1}{2}(8x-3)^{-1/2} \cdot 8$

$f'(x) = \dfrac{16}{\sqrt{8x-3}} \cdot \sec^4\sqrt{8x-3} \cdot \tan\sqrt{8x-3}$

G. $y = 6t^{\frac{2}{3}} + 8t^{\frac{1}{2}} - 5t + 11$ G._____

$y' = 4t^{-1/3} + 4t^{-1/2} - 5$

$y' = \dfrac{4}{t^{1/3}} + \dfrac{4}{t^{1/2}} - 5$

H. $f(x) = \ln\left[\cos^4(3x^2+2)\right]$ H._____

$f'(x) = \dfrac{1}{\cos^4(3x^2+2)} \cdot 4\cos^3(3x^2+2) \cdot -\sin(3x^2+2) \cdot 6x$

$f'(x) = -24x\tan(3x^2+2)$

I. $y = e^{\tan^3(4x-3)}$ I._____

$y' = e^{\tan^3(4x-3)} \cdot 3\tan^2(4x-3) \cdot \sec^2(4x-3) \cdot 4$

$y' = 12\tan^2(4x-3)\sec^2(4x-3) \cdot e^{\tan^3(4x-3)}$

J. $g(x) = \ln\left[\cos\sqrt{x^2-11x+5}\right]$ J._____

$g'(x) = \dfrac{1}{\cos(x^2-11x+5)^{1/2}} \cdot -\sin(x^2-11x+5)^{1/2} \cdot \frac{1}{2}(x^2-11x+5)^{-1/2} \cdot (2x-11)$

$g'(x) = -\dfrac{(2x-11)}{2\sqrt{x^2-11x+5}}\tan\sqrt{x^2-11x+5}$

Do Four of these fairly simple problems!

8. $f(x) = 5\tan(3x^2) + 7$ 8._____

$f'(x) = 5\sec^2(3x^2) \cdot 6x$

$f'(x) = 30x\sec^2(3x^2)$

9. $y = \ln\left[\frac{(9x+5)}{(4x-7)}\right]$ 9._____

$y' = \frac{4x-7}{9x+5} \cdot \frac{(4x-7)\cdot 9 - (9x+5)\cdot 4}{[4x-7]^2}$

$y' = \frac{-83}{(9x+5)(4x-7)}$

10. $g(x) = e^{13x-5}$ 10._____

$g'(x) = e^{13x-5} \cdot 13$

$g'(x) = 13e^{13x-5}$

11. $f(x) = 4x^3 \cdot \cos(x-3)$ 11._____

$f'(x) = 4x^3 \cdot [-\sin(x-3)] + \cos(x-3) \cdot 12x^2$

$= -4x^2[x\sin(x-3) - 3\cos(x-3)]$

12. $y = \frac{5x-3}{x-2}$ 12._____

$y' = \frac{(x-2)5 - (5x-3)\cdot 1}{(x-2)^2}$

$y' = \frac{-7}{(x-2)^2}$

13. $g(x) = e^{\sin(5x)}$ 13._____

$g'(x) = e^{\sin(5x)} \cdot \cos(5x) \cdot 5$

$g'(x) = 5\cos(5x)e^{\sin(5x)}$

14. $y = \ln[\cos(3x)]$ 14._____

$y' = \frac{1}{\cos(3x)} \cdot -\sin(3x) \cdot 3$

$y' = -3\cdot\tan(3x)$