In problems 1-4 differentiate (5pts each) you can leave answer after first step

1. $f(x) = (5x^7 + 2x^6 + 9x^3)^5 (7x + 3)^8$

2. $f(x) = \dfrac{9}{(5x^2 + 8x + 1)^4}$

3. $f(x) = (7x^4 + 7x^2 + 1/x^4)^{25}$

4. $f(x) = \left(\dfrac{x^2 + 8x + 5}{x^3 + 27x + 1}\right)^{20}$

5pts 5. Find dy/dx using the chain rule if $y = 7u^8$ and $u = 4x^5 + 2x^3 + 1$

5pts 6. Find the equation of the tangent line to the curve $y = (3x - 5)^4 (x + 9)$ at $x = 2$

IN PROBLEMS 7-8 USE IMPLICIT DIFFERENTIATION TO FIND dy / dx

5pts 7. $4x^6 - 6y^3 = 9x^3 + 7y$

5pts 8. $3x^6y^5 + 7x^3 = 9y^2 + 18x$

5pts 9. Solve for x: $4^{5x+8} = (8)(4^{2x+5})$

4pts 10. Solve for x : $(5^x)(x^3) - (5^x)(13x^2) + (5^x)(42x) = 0$

4pts 11. Solve for x : $e^{4x} = 625$

IN PROBLEMS 12-16 DIFFERENTIATE THE GIVEN FUNCTIONS (5PTS EACH)

12. $f(x) = 20x^5 e^{7x}$

13. $f(x) = (8x^6 + 4x^5 + 8x + 1)^6 (e^x)$

14. $f(x) = \dfrac{e^{4x}}{(2x^2 - 5x + 3)^8}$

15. $f(x) = \ln(7x^6 + 7x^4 + 8x^3 + 9x + 8)$

16. $f(x) = (7x^2 + 4x + 3)^{11} \ln 5x$

4pts 17. Write as a single logarithm $3\ln(4x - 5) - 5\ln(3x + 1) - 2\ln(5x + 3)$

4pts 18. Differentiate $\ln[(3x - 5)^4(5x^3 + 9x + 4)^{10}]$ by writing as simpler logs first.

5pts 19. Suppose $750,000 is invested at 6% compounded quarterly for 12 years. How much will it be worth at the end of that time?

5pts 20. Suppose $500,000 is invested at 3% compounded continuously for 24 years. How much interest does it earn at the end of that time ?

4pts 21. Determine the percentage rate of change of the function at the point indicated
$f(t) = 6t^5$ at $t = 2$

FORMULAS

1. $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$
2. $\frac{f'(t)}{f(t)} \times 100\%$
3. $I = Prt$
4. $A = P(1 + r/n)^{nt}$
5. $A = Pe^{rt}$
6. $d/dx [e^{g(x)}] = e^{g(x)} g'(x)$
7. $y - y_1 = m(x - x_1)$
8. $d/dx [\ln g(x)] = \frac{g'(x)}{g(x)}$
9. $P = Ae^{-rt}$