Calculus I – Worksheet #19
Review for Test 4 - Derivatives

1. Find the derivative of $y = x^2$ with respect to ln x.	2. Find the derivative of y^2 with respect to x^4 if $y = \sqrt{x^2 + 5}$.
3. Simplify: $e^{4 \ln x}$	4. Find $\frac{dy}{dx}$ if $y = 3^{x+1}$
5. Find $\frac{dy}{dx}$ if $y = (\ln x)^x$	6. Find $\frac{dy}{dx}$ if $y = \sqrt{4x^2 + 4x}$
7. Find $\frac{dy}{dx}$ if $y = \cos x \sin x$	8. Find $\frac{dy}{dx}$ if $y = \cos^3 5x$
9. Find $\frac{dy}{dx}$ if $y = \ln(xe^{2x})$	10. Which of the following functions does not have a derivative equal to $\frac{1}{x}$? A. $\ln(ex)$ B. $\ln(2x)$ C. $\ln(e^{\ln x})$ D. $\ln(xe^x)$
11. Write the equation of the tangent line to $f(x) = e^{2x}$ at x = 2.	12. Find $\frac{dy}{dx}$ if $y = \ln(6x^2 - 3)$
13. Simplify: $e^{4x+2\ln x}$	14. Find $\frac{dy}{dx}$ if $y = \ln\lvert\sin 3x\rvert$.
15. Find $\frac{dy}{dx}$ if $y = 2^{\cos x}$	16. Find $\frac{dy}{dx}$ if $y = \ln\left(\frac{x^2}{e^{6x}}\right)$
17. Find $\frac{dy}{dx}$ if $y = x^2 \sec 4x$	18. Find the derivative of $y = x^3 + 2x^2$ with respect to cos x..
19. Find $\frac{dy}{dx}$ if $y = x^{\cot 2x}$.	20. Find $\frac{dy}{dx}$ if $y = \cos^2(3x) + \sin^2(3x)$

Answers:

1. $2x^2$	2. $\frac{1}{2x^2}$	3. x^4	4. $3^{x+1} \ln 3$
5. $(\ln x)^x \left[\frac{1}{\ln x} + \ln(\ln x)\right]$	6. $\frac{2x+1}{\sqrt{x^2 + x}}$	7. $\cos 2x$	8. $-15\cos^2 5x \sin 5x$
9. $\frac{1+2x}{x}$	10. D	11. $y - e^4 = 2e^4(x-2)$	12. $\frac{12x}{6x^2-3} = \frac{4x}{2x^2-1}$
13. $x^2 e^{4x}$	14. $3\cot 3x$	15. $-2^{\cos x}(\ln 2)(\sin x)$	16. $\frac{2-6x}{x}$
17. $2x \sec 4x(1 + 2x \tan 4x)$	18. $\frac{-3x^2 - 4x}{\sin x}$	19. $\left(-2\ln x \csc^2 2x + \frac{\cot 2x}{x}\right) x^{\cot x}$	20. 0