Math 106, Spring 2024

Worksheet 1, Tuesday, February 6, 2024

For $\#1-8$, compute the Derivative of the following functions. Simplify if possible.

1. $y = x^{\frac{3}{2}} \cdot \tan x$
2. $f(x) = x\cos x - \sin x$
3. $y = \sec^7 x$
4. $f(x) = \tan\sqrt{1-x^8}$
5. $y = \cos\left(\dfrac{1}{x}\right)$
6. $y = \dfrac{1}{\cos x}$
7. $f(x) = \sin^6(x^3 - 5x)$
8. $y = \sqrt{\tan\sqrt{x}}$

9. Find the values of $\sin\left(\dfrac{7\pi}{6}\right)$. and $\cos\left(\dfrac{7\pi}{6}\right)$. Justify. Show work using Unit Circle/Trig Triangles.

10. Let $H(x) = \sin(7x)$. Compute $H'\left(\dfrac{\pi}{6}\right)$. Hint: #9 above might help with evaluation

11. If $\sin\theta = \dfrac{2}{7}$, evaluate $\tan\theta = ?$ and $\sec\theta = ?$ keeping $0 < \theta < \dfrac{\pi}{2}$

12. Let $f(x) = \tan(2x) + \cos(2x) + 16\cos x$. Show that $f'\left(\dfrac{\pi}{6}\right) = \boxed{-\sqrt{3}}$

13. The top of a ten foot ladder is sliding down a vertical wall at the rate of one foot every second. Consider the angle formed by the bottom of the ladder and the ground. How fast is this angle changing when the top of the ladder is three feet above the ground?

14. Compute the derivative $\dfrac{dy}{dx}$ for the curve $y^2 + \cos x = x \cdot y^3$ Use Implicit Differentiation.

15. FUN CHALLENGE: Differentiate $\dfrac{d}{dx}\cos\left(\dfrac{\dfrac{6}{x^6} + \tan(3x)}{\dfrac{4}{x} + \sec x}\right)$ Do **Not** Simplify.

Turn in your own solutions into Gradescope before 11:59 pm today, Tuesday Feb 6

Finish at least through number 13