

## Homework #4

Due **SUNDAY, February 20th** in Gradescope by 11:59 pm ET**Goal:** More Trig Derivatives and Review Related Rates with TrigonometryFor #1 – 5, compute the Derivative for each of the following functions. Do **Not** simplify.

1.  $f(x) = \cos(3x) \cdot \tan(1 - x^2)$       2.  $y = \sqrt{\cos \sqrt{x}}$       3.  $f(x) = \cos(\sin(\cos x))$

4.  $y = \left( \frac{\cos(7x)}{\sin(8x)} \right)^6$       5.  $f(x) = \sin \left( \tan \left( \sqrt{9 + x^8} \right) \right)$

6. If  $g(x) = x \sin x$ , find  $g''(\pi)$

7. Consider  $G(x) = 4 \sin^2 x$ . Compute  $G' \left( \frac{\pi}{6} \right)$ . Simplify.

8. Let  $W(x) = \cos^2(2x) + 3 \sec x$ . Compute  $W' \left( \frac{\pi}{6} \right)$ . Simplify.

9. Given  $y = 2 \sin x + 3 \cos x$ , show that the function satisfies  $y'' + y = 0$ .

10. Compute  $\frac{dy}{dx}$  when  $\tan y + \sin x = x^2 - 5y^3$ . Hint: Use Implicit Differentiation.

Related Rates with Trigonometry: Give a full detailed and labeled solution for these word problems.

11. A ladder 10 ft long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a rate of 1 feet per second, how fast is the angle between the ladder and the wall changing when the bottom of the ladder is 4 ft from the wall?

12. A kite 10 ft above a fixed point P on the ground moves horizontally at a speed of 4 feet per second. At what rate is the angle between the string and the horizontal *decreasing* when 20 ft of string has been let out?

# REGULAR OFFICE HOURS

**Monday: 1:00–3:00 pm**

**Tuesday: 12:00–4:00 pm**

7:30–9:00 pm TA Bobby, SMUDD 205

**Wednesday: 1:00-3:00 pm**

**Thursday: none for Professor**

7:30–9:00 pm TA Bobby, SMUDD 205

**Friday: 12:00–2:00 pm**

- Related Rates with Trig functions keeps the same Related Rates Structure but uses different Equations. Label your steps.