

Due Sunday, February 8, 2026 in Gradescope by 11:59 pm

Instructions:

- This is an Open Notes Quiz. You can use materials, homeworks problems, lecture notes, etc. that you manually worked on.
- This is **NOT** an Open Internet Quiz. You can only access our Main Course Webpage.
- You are not allowed to work on or discuss these problems with other students, professor, Math Fellow TA or simply put anyone.
- You can ask a few small, clarifying, questions in Office Hours, but the problems will not be solved for you.
- The main goal is to make a thoughtful and detailed presentation for the solutions. Submit a clear final draft. No mess please.
- Please submit your final work in Gradescope in the Quiz 2 entry.

1. [5 points each] Differentiate the following functions. Do **not** simplify your answers.

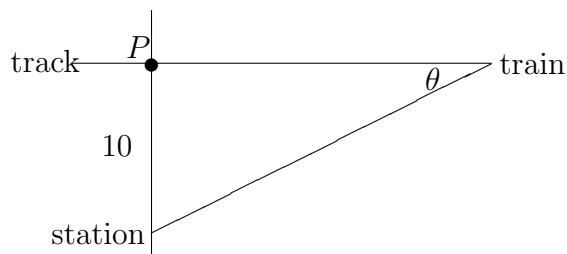
$$(a) f(x) = \sqrt{\cos\left(3x^2 - \frac{1}{x^8}\right)} \quad (b) f(x) = \tan^6\left(\sqrt{x} - \frac{8}{\sqrt{x}}\right) \stackrel{\text{prep}}{=} \left(\tan\left(\sqrt{x} - \frac{8}{\sqrt{x}}\right)\right)^6$$

2. [10 points] Consider $f(x) = \frac{\sin x}{1 + \cos x}$.

First, show that $f'(x) = \frac{1}{1 + \cos x}$. Second, show that $f'\left(\frac{\pi}{3}\right) = \boxed{\frac{2}{3}}$.

3. [10 points] Consider a point P on a train track. Suppose a train depot station is 10 feet directly south from this point P . The train is travelling east at 6 feet per second. Consider the angle as shown in the diagram. How fast is this angle changing when the train is 12 feet from point P . LABEL all steps

- Diagram



The picture at arbitrary time t is:

4. [10 points] Let $H(x) = \sin(8x) + \cos(2x) - \frac{2}{3}\sin(6x)$. Show that $H'\left(\frac{\pi}{6}\right) = \boxed{-\sqrt{3}}$.

DO NOT SPEAK TO ANYONE ELSE ABOUT THIS QUIZ