

Math 106      Take-Home Quiz #3

Due Sunday, February 15, 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 3 entry.

**1.** [20 points] Compute the **Most General Antiderivative** for each of the following.

(a)  $\int 4x^7 + \frac{7}{x^4} + x^{\frac{4}{7}} + \frac{1}{x^{\frac{7}{4}}} - \frac{4}{7x^{\frac{4}{7}}} - \frac{7}{4} + \frac{7}{4}x + \frac{1}{7x^7} - \frac{7}{4x^7} dx$

(b)  $\int \frac{\left(x^2 + \frac{1}{x}\right)\left(x + \frac{1}{x^2}\right)}{\sqrt{x}} dx$  Hint: FOIL numerator and then *split-split-split...*

**2.** [10 points] Consider a function  $f$  with  $f''(x) = -3 + 12x - 12x^2$  and that satisfies  $f'(1) = -4$  and  $f(0) = 4$ .

(a) Find  $f(x)$ .      (b) Use  $f(x)$  from (a) to Compute  $f(1)$ . Simplify.

**3.** [10 points] Consider a function  $f$  with  $f'(x) = \sec^2 x - 4 \sin x$  and that satisfies  $f(\pi) = -6$ .

(a) Find  $f(x)$ .      (b) Use  $f(x)$  from (a) to Compute  $f\left(\frac{\pi}{3}\right)$ . Simplify.

**4.** [10 points] A Ball is thrown straight upwards *from the ground* with initial velocity  $v_0 = 96$  feet per second. Hint:  $(16) \cdot 6 = 96$

Draw a labelled Sketch. Justify all of the formulas, no guessing here.

**When** does the Ball reach its Maximum Height? **What** is the Maximum Height?

**When** does the Ball hit the ground? **What** is the Velocity at impact with the ground?

DO NOT SPEAK TO ANYONE ELSE ABOUT THIS QUIZ