

## Math 121 Take-Home Quiz #3

Due Sunday, September 19, 2021 in Gradescope by 11:59 pm ET

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 or people.
- 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. [10 Points] Show that  $\lim_{x \rightarrow 0} \frac{\ln(1 - 5x) + \arcsin(5x)}{3xe^x - \arctan(3x)} = \boxed{-\frac{25}{6}}$

2. [10 Points] Show that  $\lim_{x \rightarrow \infty} \left(1 - \frac{8}{x^3}\right)^{x^3} = \boxed{e^{-8}}$

3. [10 Points] Show that  $\int_0^1 (x + 1) \arctan x \, dx = \boxed{\frac{\pi - 1 - \ln 2}{2}}$

Hint: You can work the integral right away OR you can distribute the  $\arctan x$  and split it up into two pieces.

**Optional Bonus: [+ 2 extra points]** Compute  $\int \ln(3x^2 + 4) \, dx$ .

This is an optional problem, and you only will get bonus points for a fully correct solution.