

Math 121 Take-Home Quiz #4

Due Sunday, October 3, 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 4 entry.

1. [10 Points] Determine if the following Divergent Improper Integral diverges to $+\infty$ or $-\infty$.

$$\int_{-1}^4 \frac{6}{x^2 - 2x - 8} dx$$

2. [10 Points] Show that the following Convergent Improper Integral

$$\int_{-\infty}^4 \frac{6}{x^2 - 2x + 10} dx = \boxed{\frac{3\pi}{2}}$$

3. [10 Points] Show that the following Convergent Improper Integral

$$\int_0^1 x^3 \ln x dx = \boxed{-\frac{1}{16}}$$

Hint: You will need a familiar L'Hopital's Rule finish.