Math 121   Take-Home Quiz #4

Due Sunday, March 3, 2024 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 this 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 Limit finish.