Math 121 Take-Home Quiz #1

Due Sunday, September 17, 2023 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, professor, Math Fellow TA or simply put anyone.

• You can ask Prof. Benedetto 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 1 entry.

Note: Yes! You can use the a-rules for free for any problem here, if needed

1. [10 Points] Show that $$\int_4^{4\sqrt{3}} \frac{1}{\sqrt{64-x^2}} + \frac{1}{16+x^2}\, dx = \boxed{\frac{3\pi}{16}}$$

2. [10 Points] Show that $$\int_0^{\frac{1}{2}\ln\sqrt{3}} \frac{e^{2x}}{1+e^{4x}}\, dx \overset{\text{hint}}{=} \int_0^{\frac{1}{2}\ln\sqrt{3}} \frac{e^{2x}}{1+(e^{2x})^2}\, dx = \boxed{\frac{\pi}{24}}$$

3. [10 Points] Compute $$\int \frac{x^2}{x^2+1}\, dx$$

4. [10 Points] Show that $$\int_1^e \frac{1}{x\sqrt{4-(\ln x)^2}}\, dx = \boxed{\frac{\pi}{6}}$$

5. [10 Points] Show that $$\int_0^{\ln 3} \frac{1}{e^x(4-e^{-x})}\, dx = \boxed{\ln\left(\frac{11}{9}\right)}$$

DO NOT SPEAK TO ANYONE ELSE ABOUT THIS QUIZ