Due Sunday, September 15, 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.

• Do **NOT** plug these problems into any computer.

• 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 Take Home Quiz 1 entry.

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

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

2. [10 Points] Show that $\displaystyle\int_{0}^{\frac{1}{2}\ln\sqrt{3}} \frac{e^{2x}}{1 + e^{4x}} \ dx \stackrel{\text{hint}}{=} \int_{0}^{\frac{1}{2}\ln\sqrt{3}} \frac{e^{2x}}{1 + \left(e^{2x}\right)^2} \ dx = \boxed{\dfrac{\pi}{24}}$

3. [10 Points] Show that $\displaystyle\int_{1}^{e} \frac{1}{x\sqrt{4 - (\ln x)^2}} \ dx = \boxed{\dfrac{\pi}{6}}$

4. [10 Points] Show that $\displaystyle\int_{0}^{\ln 3} \frac{1}{e^x(4 - e^{-x})} \ dx = \boxed{\ln\left(\dfrac{11}{9}\right)}$