Math 1231 Spring 2024
Single-Variable Calculus I Section 11
Mastery Quiz 14
Due Tuesday, April 30

This week's optional mastery quiz has two topics. You may not need to submit either. If you have a 4/4 on M4, or a 2/2 on S10, you don't need to submit them.

Feel free to consult your notes, but please don't discuss the actual quiz questions with other students in the course.

Remember that you are trying to demonstrate that you understand the concepts involved. For all these problems, justify your answers and explain how you reached them. Do not just write "yes" or "no" or give a single number.

Please turn this quiz in class on Thursday. You may print this document out and write on it, or you may submit your work on separate paper; in either case make sure your name and recitation section are clearly on it. If you absolutely cannot turn it in in person, you can submit it electronically but this should be a last resort.

Topics on This Quiz

- Major Topic 4: Integration

- Secondary Topic 10: Integral Application

Name:

Recitation Section:

Major Topic 4: Integration

(a) Compute $\int x^3 \sqrt{x^2 + 1}\, dx$

(b) **By changing the bounds of the integral** compute $\int_0^{\sqrt{\pi}} x \sin(x^2)\, dx =$

(c) Compute $\displaystyle \int \frac{x^2}{\sqrt{4x^3 + 8}}\, dx$.

Secondary Topic 10: Integral Applications

(a) Find the volume of the solid of revolution formed by rotating the region bounded by $y = x^2$ and $y = x + 2$ about the line $y = 5$.

(b) A spring with natural length of 30 cm takes 10 N of force to stretch to 40 cm. How much work does it take to stretch it from 40 cm to 50 cm? What units does this answer have?

(c) Find the work done by winding up a hanging cable of length 100 ft and weight of 6 pounds per foot. Give units in your answer.