

MAT – 112: Calculus I and Modeling

EFY 8

Instructor: Thomas R. Cameron

Due: April 6, 2018

Instructions

Please complete each of the following problems. You should work in groups of three, or at most four, and hand in only one submission per group. Be sure that your arguments are well justified and presented clearly.

Problem 1. Use the Fundamental Theorem of Calculus (on p. 398 of your book) to justify the following properties of the definite integral, where all indicated integrals are assumed to exist.

1. $\int_a^a f(x)dx = 0$,
2. $\int_a^b kf(x)dx = k \int_a^b f(x)dx$,
3. $\int_a^b [f(x) + g(x)]dx = \int_a^b f(x)dx + \int_a^b g(x)dx$,
4. $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ for any c in the interval $[a, b]$,
5. $\int_a^b f(x)dx = - \int_b^a f(x)dx$.

Problem 2. Suppose that $y = f(x)$ where $f'(x)$ is well-defined on the interval $[a, b]$, and let $y_1 = f(a)$ and $y_2 = f(b)$. What is the relation between the area of the rectangle with dimensions $(y_2 - y_1) \times 1$ and the area bound by the curve $f'(x)$, the x -axis, $x = a$, and $x = b$.