

Complete the following problems in preparation for your final exam.

1. Calculate the following indefinite integrals in order to find a family of anti-derivative.

(a)  $\int 3x^4 + \frac{4}{5x^2} dx.$

(b)  $\int \frac{3}{x} + 7e^x dx.$

(c)  $\int 36x^3(3x^4 + 5)^7 dx.$

(d)  $\int \frac{12x^2}{x^3 + 1} dx.$

2. Consider the function  $f(x) = 4e^{-x^2}$  on the interval  $[-2, 1]$ . Calculate the left and right-hand Riemann Sums using three subintervals .

3. Consider an unknown function  $f(x)$  on the interval  $[1, 7]$ . Suppose we do know that  $2 \leq f(x) \leq 4$  on  $[1, 7]$ . Draw a geometric representation of this information and determine the range of value  $\int_1^7 f(x) dx$  could obtain.

4. Suppose  $\int_{-3}^3 g(x) dx = -10$ . We also know  $\int_1^3 g(x) dx = 4$ , what is the value of  $\int_{-3}^1 g(x) dx$ ?

5. Calculate the following definite integrals.

(a)  $\int_{-1}^1 \sqrt[3]{x} + 4x^5 - 5 dx$ .

(b)  $\int_0^{10} e^{4x} dx$ .

(c)  $\int_3^5 \frac{5x}{x^2} dx$ .

6. Suppose you own a new company that specifically targets “millennials”. You decide the best course of action is to produce avocados and “truly white” seltzers. Let  $x$  be the amount of time in months since start up, the revenue function is  $R(x) = x^2 - 3$  in hundreds of thousands of dollars per month, and the cost function is  $C(x) = 2x + 5$  in hundreds of thousands of dollars per month. Calculate the area between the two curves on the interval  $[0, 9]$  and interpret your answer in context of the question.