

Group Exam 4

Name: _____

Math 141-2, Calculus I

Name of group member: _____

Professor McNicholas

Name of group member: _____

Show your work and make sure your answers are well organized, easy to follow, and properly explained.

Problem 1:

a. Given the graph of $f(t)$ shown below, consider the integral $\int_0^{10} f(t)dt$. Clearly mark the lengths and areas representing each of the following quantities associated with the right-hand-sum approximation of

$$\int_0^{10} f(t)dt \quad \text{using } n = 5. \quad (1)$$

- i. $t_0, t_1, t_2, t_3, t_4, t_5$
- ii. $f(t_0), f(t_1), f(t_2), f(t_3), f(t_4), f(t_5)$
- iii. Δt
- iv. The RHS approximation of $\int_0^{10} f(t)dt$ with $n = 5$

b. Given $g(x) = \int_2^x f(t)dt$ and the following graph of $f(t)$, list the following quantities in ascending order:

$$g(1), \quad g(2), \quad g(3), \quad g(4), \quad g(5)$$

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Problem 1:

Consider the left-hand-sum approximation of $\int_0^8 e^{x^2} dx$ using $n = 4$.

a. What is Δx

b. Using $n = 4$, calculate the left-hand-sum approximation by hand (i.e. not using a calculator program).
To show your work, write out the terms you are adding together.

c. Is your approximation an overestimate or an underestimate? How do you know?

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Problem 2:

Given $f(x) = 7x^3 - 12x$ and $g(x) = 3x^3 - x^2 + 5$, use the first fundamental theorem of calculus to find

$$\int_{-1}^2 [f(x) - g(x)] dx \quad \underline{\text{EXACTLY}}. \quad (2)$$

You must show your work to receive full credit.

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Problem 2:

Given $g(x) = \int_1^x \ln(t) dt$,

a. Find an expression for the composite function $h(x) = g(x^2)$.

b. Find $h'(x)$

c. At $x = 2$, is the function $h(x)$ increasing or decreasing?

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Problem 3:

a. The following graph represents the rate of change in the population of a small eastern Oregon town. If the population in 1970 was 500 people, what was the population in 1995?

b. Shade the area on the following graph representing $\int_a^c [f(x) - g(x)] dx + \int_c^b [f(x) - g(x)] dx$.

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