

Chapter 5 Exam

A. P. Calculus

Mr. Lemay February 10, 2017

Section I, Part A

Time-10 minutes Number of questions - 5

A CALCULATOR MAY NOT BE USED ON THIS PART OF THE EXAMINATION

Directions: Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given. Clearly mark your selection.

1. Find $\frac{dy}{dx}$ if $y = \int_0^{2x} (t^2 + 5t - 3) dt$

- (a) $2x + 5$
- (b) $x^2 + 5x - 3$
- (c) $2x^2 + 10x - 3$
- (d) $8x^2 + 20x - 6$
- (e) $4x^2 + 10x - 3$

$$\begin{aligned} & ((2x)^2 + 5(2x) - 3) \cdot 2 \\ & (4x^2 + 10x - 3) \cdot 2 \end{aligned} \quad \text{D}$$

2. Evaluate $\int_e^{e^2} \frac{4}{x} dx$

- (a) 1
- (b) 4
- (c) e^3
- (d) $4e^3$
- (e) $\frac{4}{0} = \infty$

$$4 \ln x \Big|_e^{e^2} = 4 \ln e^2 - 4 \ln e = 8 - 4 = 4$$

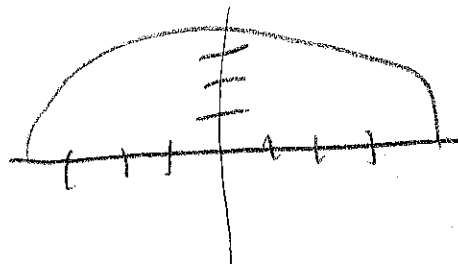
3. Use the graph of the integrand and areas to evaluate $\int_0^3 \sqrt{9 - x^2} dx$

(a) 9π

(b) $\frac{9\pi}{2}$

(c) $\frac{9\pi}{4}$

(d) $\frac{9}{2}$



$$\frac{1}{4} \pi (3)^2$$

$$\frac{1}{4} \pi (3)^2$$

Old exam for practice

4. Express the limit as a definite integral $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (2c_k + \frac{1}{c_k^2}) \Delta x$, where P is any partition of $[7, 15]$

(a) $\int_7^{15} 2x + \frac{1}{x^2}$

(b) $\int_7^{15} 2x + \frac{1}{x^2} dx$

(c) $\int_{15}^7 2x + \frac{1}{x^2} dx$

(d) $\int_7^{15} \frac{2x dx}{x^2}$

(e) $\int_7^{15} \frac{2dx}{x^2}$

$$\int_7^{15} 2x + \frac{1}{x^2} dx$$

5. Suppose that f and g are continuous functions and $\int_3^5 f(x) dx = 7$, $\int_3^5 g(x) dx = 2$, $\int_0^5 g(x) dx = 4$. Which of the following must be true?

I. $\int_0^3 g(x) dx = 2$

II. $\int_3^5 f(x)g(x) dx = 14$

III. $\int_3^5 [f(x) - g(x)] dx = 5$

(a) I and II

(b) I and III

(c) II and III

(d) III only

(e) I, II and III

$$4 - 2 = 2$$

B

Section I, Part B

Time-12 minutes Number of questions - 4

A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE EXAMINATION

Directions: Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given. Clearly mark your selection

6. Use your calculator to find $\int_{2.6}^{3.8} \frac{\sin^2 x}{4-x} dx$

(a) -1.78

(b) 0.30

(c) 1.18

(d) 1.64

(e) 1.78

MATH 9

7. What is the average value of the function $f(x) = \frac{e^x}{x}$ on the interval $[5, 10]$?

(a) 98.082

(b) 490.409

(c) 583.415

(d) 588.490

(e) 2452.044

$$\frac{1}{5} \int_5^{10} \frac{e^x}{x} dx$$

MATH 9

t	0	2	3	6	7
$v(t)$	5	3	2	3	4

8. A caterpillar travels along a straight piece of wire. Its velocity v , in inches per minute at certain times t along its journey is given in the table above. Using a left Riemann sum with $n = 4$ subdivisions, what is the approximation of the total distance traveled by the caterpillar from $t = 0$ to $t = 7$?

(a) 20

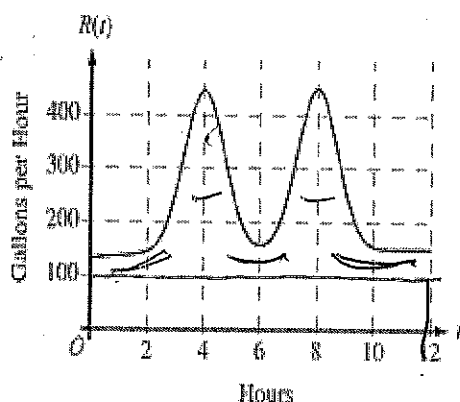
(b) 20.5

(c) 21

(d) 21.5

(e) 22

$$\begin{array}{l} 2(5) \quad 10 \\ 1(3) \quad 3 \\ 3(2) \quad 6 \\ 1(3) \quad 3 \end{array}$$



$$7(200)$$

$$12(100)$$

$$1200$$

$$1400$$

$$\hline 2600 \checkmark$$

9. Water is flowing into a tank at a rate of $R(t)$ gallons per hour. The graph of $R(t)$ is shown above. If at time $t = 0$, the tank held 1,000 gallons of water, which of the following best estimates the number of gallons of water in the tank at time $t = 12$?

(a) 1,600

(b) 2,600

(c) 3,600

(d) 4,600

(e) 5,600

Old exam for practice

AP Calculus
Section II

Time 21 minutes Number of problems (two full AP and a Textbook problem)
Percent of total grade-50

A GRAPHING CALCULATOR IS REQUIRED FOR SOME PROBLEMS OR PARTS OF
PROBLEMS ON THIS SECTION OF THE EXAMINATION.

REMEMBER TO SHOW YOUR SETUPS AS DESCRIBED IN THE GENERAL
INSTRUCTIONS

A particle moves along the x-axis so that its velocity at time t , $0 < t < 5$, is given by

$v(t) = 3(t-1)(t-3)$. At time $t = 2$, the position of the particle is $x(2) = 0$.

$$v(t) = 3t^2 - 12t + 9$$

a. Find the minimum acceleration of the particle.

$$a(t) = 6t - 12$$

$$a'(t) = 6$$

$a(t)$ is always increasing so

$$a(0) = -12 \text{ min}$$

b. Find the total distance traveled by the particle.

$$\int_0^5 |3t^2 - 12t + 9| dt$$

use Frint
math 9

28

c. Find the average velocity of the particle over the interval $0 < t < 5$.

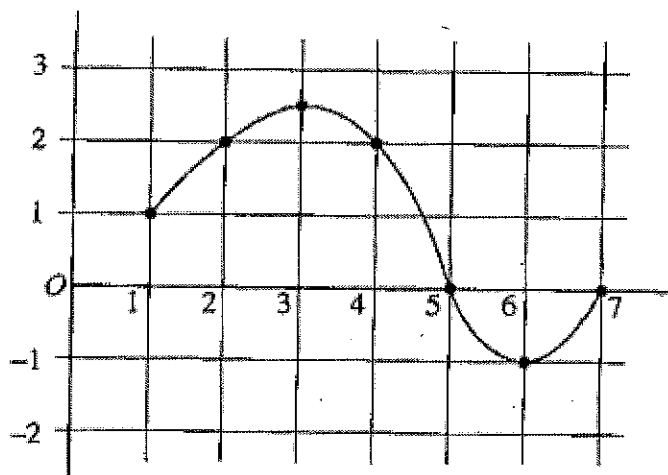
$$\frac{1}{5} \int_0^5 v(t) dt$$

math 9
5

20
5 = 4

Old exam for practice

The graph of a differentiable function f on the closed interval $[1, 7]$ is shown.



Let $h(x) = \int_1^x f(t) dt$ for $1 < x < 7$.

a. Find $h(1)$.

$$\int_1^1 f(t) dt = 0$$

b. Find $h'(4)$.

$$h'(4) = \frac{d}{dx} \int_1^x f(t) dt = f(x) \text{ or } f(4) = 2$$

c. On what interval or intervals is the graph of h concave upward? Justify your answer.

$$h''(x) = f'(x) \quad f'(x) > 0$$

$$[1, 3) \cup (6, 7]$$

d. Find the value of x at which h has its minimum on the closed interval $[1, 7]$. Justify your answer

@ $x=1$ because the positive area from (1, 5) is greater than the negative area from (5, 7) so 0 is smaller than the other values.