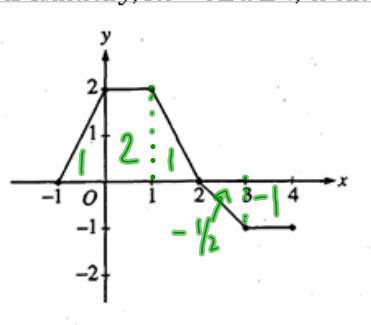


Name \_\_\_\_\_

Calculus  
Chapter 5 Review Questions

A CALCULATOR MAY NOT BE USED FOR THESE QUESTIONS!

1. The graph of a piecewise-linear function  $f$ , for  $-1 \leq x \leq 4$ , is shown below. What is the value of  $\int_{-1}^4 f(x) dx$ ?



- A. 1      B. 2.5      C. 4      D. 5.5      E. 8

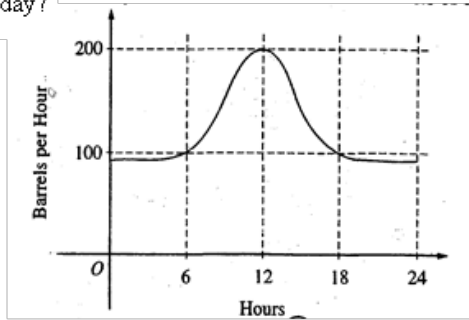
2.  $\int_1^2 \frac{1}{x^2} dx = \int_1^2 x^{-2} dx = \left. \frac{x^{-1}}{-1} \right|_1^2$

- A.  $-\frac{1}{2}$       B.  $\frac{7}{24}$       C.  $\frac{1}{2}$       D.  $2 \ln 2$       E. 1

3.  $\int_0^x \sin t dt = -\cos t \Big|_0^x$

- A.  $\sin x$       B.  $-\cos x$       C.  $\cos x$       D.  $\cos x - 1$       E.  $1 - \cos x$

4. The flow of oil, in barrels per hour, through a pipeline on July 9 is given by the graph shown above. Of the following, which best approximates the total number of barrels of oil that passed through the pipeline that day?



- A. 500      B. 600      C. 2,400      **D. 3,000**      E. 4,800

5. If  $f$  is a linear function and  $0 < a < b$ , then  $\int_a^b f''(x) dx = \int_a^b 0 dx = 0(b-a)$

- A. 0**      B. 1      C.  $\frac{ab}{2}$       D.  $b-a$       E.  $\frac{b^2-a^2}{2}$

6. What are all values of  $k$  for which  $\int_{-3}^k x^2 dx = 0$ ?

$$\frac{x^3}{3} \Big|_{-3}^k = \frac{k^3}{3} - \frac{-3^3}{27} = 0$$

- A. -3**      B. 0      C. 3      D. -3 and 3      E. -3, 0, and 3

7. If  $\int_{-2}^2 f(x) dx = 4$ ,  $\int_2^5 f(x) dx = 3$ , and  $\int_{-2}^5 g(x) dx = 2$ , which of the following are false?

- I.  $\int_2^5 f(x) dx = -3$   
 II.  $\int_{-2}^5 [f(x) + g(x)] dx = 9$   
 III.  $f(x) \leq g(x)$  on the interval  $-2 \leq x \leq 5$

- A. I only      B. II only      **C. III only**  
 D. I and III only      D. I, II and III

area under  $f(x) >$   
 area under  $g(x)$   
 so  $f(x) > g(x)$

8. Find the total area between the curve  $y = 4 - x$  and the x-axis between  $0 \leq x \leq 6$  using only areas.

$$\text{total area} = 10$$

9. Find the value of  $\int_a^b (4-x) dx$  using areas. Draw a picture and show your work.

10. Evaluate  $\int_1^e \frac{1}{x} dx$

$\ln x \Big|_1^e = \ln e - \ln 1 = 1$



trapezoid  $\frac{(b-a)(8-a-b)}{2}$

A CALCULATOR MAY BE NECESSARY FOR COMPLETING SOME OF THESE PROBLEMS!

11. Evaluate  $\int_0^1 \frac{36}{(2x+1)^3} dx$  using NINT on your calculator.

12. Find the average value of  $y = \sqrt{x}$  over the interval  $[0,4]$ .

$$\frac{4}{3}$$

13. Find  $\frac{d}{dx} \int_2^x \sqrt{2 + \cos^2 t} dt$

$$\sqrt{2 + \cos^2 x}$$

14. Find  $\frac{d}{dx} \int_x^{2x} (\sin^2 t) dt$ .

$$2\sin^2 2x - \sin^2 x$$

15. Use MRAM to estimate the area under the curve of  $y = \frac{1}{x}$  from  $x = 1$  to  $x = 5$  using 4 subintervals of equal lengths.

$$\frac{2}{3} + \frac{2}{5} + \frac{2}{7} + \frac{2}{9} = \boxed{1.575}$$