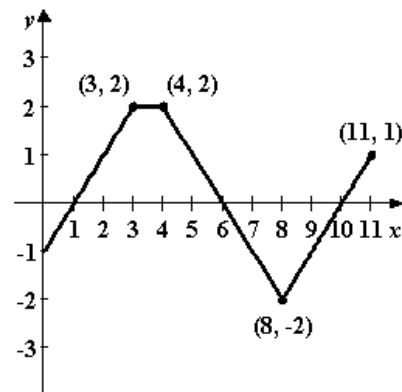


1. The graph of  $f$  shown to the right consists of line segments.

Evaluate  $\int_0^8 f(x) dx$  using geometric formulas.

- (A) 4.5      (B) 6.5  
 (C) 3.5      (D) 2.5  
 (E) 5.5



2. Given  $\int_0^2 f(x) dx = -1$ ,  $\int_1^2 f(x) dx = \frac{3}{2}$ ,  $\int_2^5 f(x) dx = \frac{5}{2}$ . What is the value of  $\int_5^0 3f(x) dx$  ?

- (A)  $-\frac{3}{2}$       (B)  $\frac{3}{2}$       (C)  $-\frac{9}{2}$   
 (D)  $\frac{9}{2}$       (E)  $-9$

3. Find the area depicted by the definite integral  $\int_{-3}^3 \sqrt{9-x^2} dx$  .

- (A)  $9\pi$       (B)  $\frac{9\pi}{4}$   
 (C)  $\frac{9}{2}$       (D)  $\frac{9\pi}{2}$   
 (E)  $\frac{9}{8}\pi$

4. A car travels in a straight line for several hours. Its velocity,  $v$ , in miles per hour is shown in the table. For each problem, approximate the distance the car traveled using the given method and number of rectangles/trapezoids,  $n$ .

Time (hr)	0	2	5	7	11
Velocity (mph)	1	5	8	9	11

a.) Left Rectangles,  $n=4$

b.) Right Rectangles,  $n=4$

c.) Trapezoids,  $n=4$

d.) Midpoint Rectangles,  $n=2$

5. The graph of the function  $f(x) = 25 - x^2$  is shown to the right. Which of the following definite integrals yields the area of the shaded region?

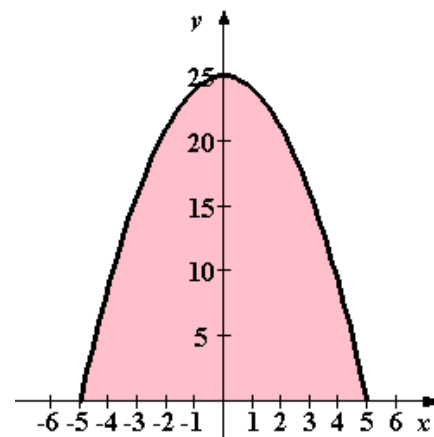
a.  $\int_0^5 (25 - x^2) dx$

b.  $\int_{-25}^{25} (25 - x^2) dx$

c.  $\int_0^{25} (25 - x^2) dx$

d.  $2 \int_0^5 (25 - x^2) dx$

e.  $2 \int_{-5}^5 (25 - x^2) dx$



6. Find the area depicted by the definite integral  $\int_{-5}^5 (5 - |x|) dx$ .

- a. 36      b. 25      c. 75      d. 22      e. 129.5

7. Given  $\int_2^3 x dx = \frac{5}{2}$ . What is the value of  $\int_3^2 12x dx$ ?

- a. -12      b. -30      c. -76      d. 30      e. -195

8.

$x$	-4	-3	-2	-1
$f(x)$	0.75	-1.5	-2.25	-1.5
$f'(x)$	-3	-1.5	0	1.5

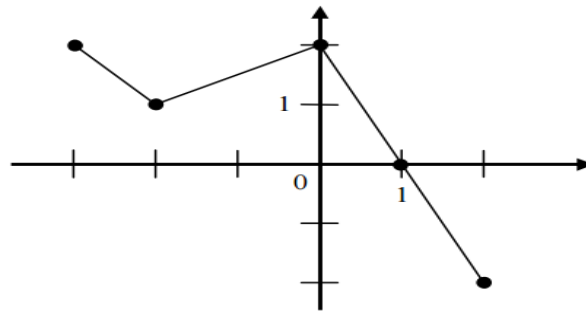
85. The table above gives values of a function  $f$  and its derivative at selected values of  $x$ . If  $f'$  is continuous on the interval  $[-4, -1]$ , what is the value of  $\int_{-4}^{-1} f'(x) dx$ ?

- (A) -4.5      (B) -2.25      (C) 0      (D) 2.25      (E) 4.5

9. Evaluate  $\int_0^1 x\sqrt{1-x^2} dx$

- a.  $\frac{1}{6}$       b.  $\frac{1}{3}$       c. 1      d.  $\frac{2}{3}$       e.  $-\frac{1}{3}$

10.



Graph of  $f$

9. The graph of the piecewise linear function  $f$  is shown in the figure above. If

$g(x) = \int_{-2}^x f(t) dt$ , which of the following values is greatest?

- (A)  $g(-3)$     (B)  $g(-2)$     (C)  $g(0)$     (D)  $g(1)$     (E)  $g(2)$

11. Evaluate  $\int \frac{\cos x}{\sin^3 x} dx$

a.  $-\frac{(\cos x)^{-2}}{2} + C$

b.  $\frac{(\sin x)^{-3}}{2} + C$

c.  $-\frac{(\cos x)^{-2}}{3} + C$

d.  $-\frac{(\sin x)^{-2}}{3} + C$

e.  $-\frac{(\sin x)^{-2}}{2} + C$

12. Evaluate  $\int_2^4 (4t+1) dt$

a. 8

b. 52

c. 46

d. 26

e. 2

13. Evaluate  $\int_0^1 \sqrt{x} dx$

a.  $\frac{3}{2}$

b.  $\frac{5}{4}$

c.  $\frac{7}{6}$

d.  $\frac{9}{5}$

e.  $\frac{2}{3}$

14. Evaluate  $\int_0^{6\pi} (5 \sin x + 2 \cos x) dx$

a. 1

b. 0

c. 2

d. -1

e. -2

15. Find the average value of the function  $f(x) = 30 - 6x^2$  over the interval  $-2 \leq x \leq 2$ .

a. 46

b. 38

c. 22

d. 14

e. 6

16. Find  $\frac{d}{dx} \left[ \int_0^{x^2} \frac{1}{\sqrt{1+t^3}} dt \right]$ .

a.  $\frac{1}{\sqrt{1+x^3}}$

b.  $\frac{2x}{\sqrt{1+x^6}}$

c.  $\frac{2x}{\sqrt{1+x^5}}$

d.  $\frac{x^2}{\sqrt{1+x^6}}$

e. none of the above

17. Evaluate  $\int_1^3 \frac{1}{\sqrt{4x+1}} dx$ .

a.  $\frac{\sqrt{13}-\sqrt{5}}{4}$

b.  $\frac{\sqrt{13}+\sqrt{5}}{4}$

c.  $\frac{\sqrt{13}+\sqrt{5}}{2}$

d.  $\frac{\sqrt{13}-\sqrt{5}}{2}$

e.  $\frac{\sqrt{5}-\sqrt{13}}{2}$

18. Evaluate the integral  $\int (2x^4 + 4x^3 - 2x) dx$ .

a.  $8x^3 + 12x^2 - 2 + C$

b.  $2x^5 + 5x^4 - 5x^2 + C$

c.  $\frac{2}{5}x^5 + x^4 - x^2$

d.  $\frac{2}{5}x^5 + x^4 - x^2 + C$

e. none of these

19. Evaluate the integral  $\int \frac{7 + \sqrt{x^3}}{\sqrt{x}} dx$ .

- a.  $\frac{7}{2}\sqrt{x} + \frac{3}{2}x^2 + C$     b.  $14\sqrt{x} + \frac{3}{2}x^2 + C$     c.  $-\frac{7}{2}x^{-3/2} + 3 + C$     d.  $\frac{7}{2}x^{-3/2} + \frac{3}{2}x^2 + C$     e. none of these

20. Evaluate the integral  $\int \frac{\sec^3 \theta \tan \theta}{1 + \tan^2 \theta} d\theta$ .    \*Don't forget Pythagorean Identities from Trig\*

- a.  $\frac{1}{4}\sec^4 \theta + C$     b.  $\frac{1}{2}\sec^2 \theta + C$     c.  $\frac{1}{4}\sec^2 \theta \tan^2 \theta + C$     d.  $\sec \theta + C$     e. none of these

21. Find  $y = f(x)$  if  $f''(x) = x + 2$ ,  $f'(0) = 3$ ,  $f(0) = -1$ .

- a.  $y = \frac{1}{6}x^3 + x^2 + 3x - 1$     b.  $y = \frac{x^3}{6} + 2x^2 + C$     c.  $y = x^3 + 6x^2 + 18x - 6$   
d.  $y = \frac{1}{6}x^3 + x^2 + \frac{21}{2}x + \frac{61}{6} + C$     e. none of these

22. Use  $a(t) = -32 \text{ ft/sec}^2$  as the acceleration due to gravity. A ball is thrown vertically upward from the ground with an initial velocity of 16 feet per second. How high will the ball go?

- a. 32 feet    b. 16 feet    c. 2 feet    d. 4 feet    e. none of these

23.

15.  $\int \frac{x}{x^2-4} dx =$

(A)  $\frac{-1}{4(x^2-4)^2} + C$

(B)  $\frac{1}{2(x^2-4)} + C$

(C)  $\frac{1}{2} \ln|x^2-4| + C$

(D)  $2 \ln|x^2-4| + C$

(E)  $\frac{1}{2} \arctan\left(\frac{x}{2}\right) + C$

24.

79. If  $\int_{-5}^2 f(x) dx = -17$  and  $\int_5^2 f(x) dx = -4$ , what is the value of  $\int_{-5}^5 f(x) dx$ ?

(A) -21

(B) -13

(C) 0

(D) 13

(E) 21

25.

81. If  $G(x)$  is an antiderivative for  $f(x)$  and  $G(2) = -7$ , then  $G(4) =$

(A)  $f'(4)$

(B)  $-7 + f'(4)$

(C)  $\int_2^4 f(t) dt$

(D)  $\int_2^4 (-7 + f(t)) dt$

(E)  $-7 + \int_2^4 f(t) dt$