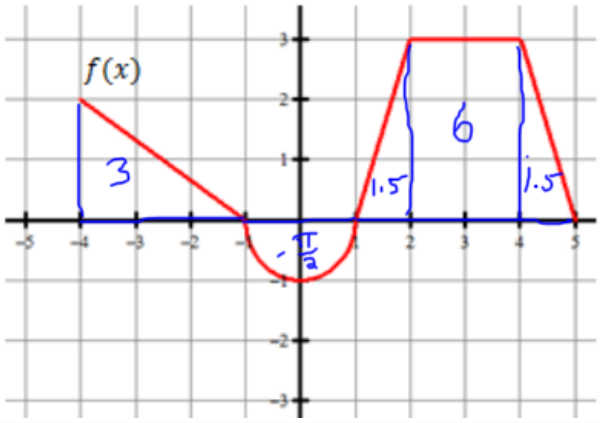
PRACTICE

The graph of f consists of line segments and a semicircle. Evaluate each definite integral.

1.



(a) $\int_{-4}^{-1} f(x)\,dx = 3$

(b) $\int_{1}^{2} f(x)\,dx = \frac{3}{2}$

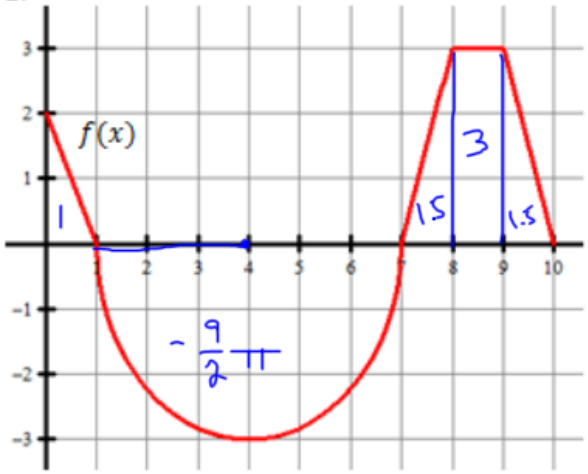
(c) $\int_{1}^{5} f(x)\,dx = 9$

(d) $\int_{-4}^{5} f(x)\,dx = 12 - \frac{\pi}{2}$

(e) $\int_{4}^{2} f(x)\,dx = -6$

(f) $\int_{-1}^{1} f(x)\,dx = -\frac{\pi}{2}$

2.



(a) $\int_{0}^{1} 2f(x)\,dx = 2$

(b) $\int_{1}^{7} f(x)\,dx = -\frac{9\pi}{2}$

(c) $\int_{0}^{7} f(x)\,dx = 1 - \frac{9\pi}{2}$

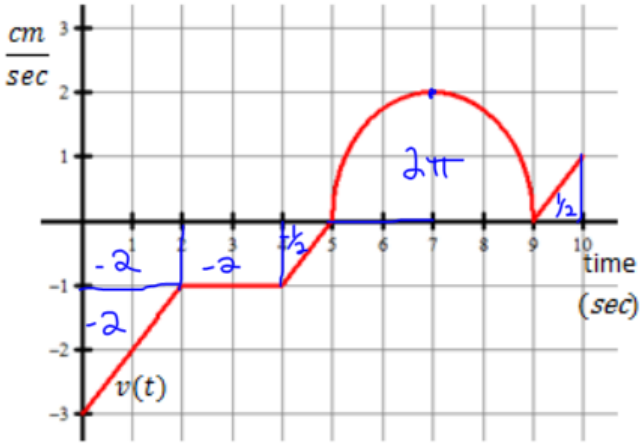
(d) $\int_{10}^{7} f(x)\,dx = -6$

(e) $\int_{8}^{8} f(x)\,dx = 0$

(f) $\int_{0}^{10} f(x)\,dx = 7 - \frac{9}{2}\pi$

The velocity of a particle moving along the x-axis is graphed with line segments and a semi-circle below.

3.



(a) Find $\int_0^{10} v(t)\,dt$. What does it represent? $2\pi - 6$

displacement = particle moved left 6.5 cm then right $2\pi+0.5$ cm, so the particle moved $2\pi-6$ from its original position.

(b) What is the total distance travelled?

$6.5 + 2\pi + 0.5 = 7 + 2\pi$ cm

(c) When is the particle speeding up?

$(5,7)\ (9,10)$

(d) When is the particle slowing down?

$(0,2)\ (4,5)\ (7,9)$

(e) How much does the particle move left?

6.5 cm

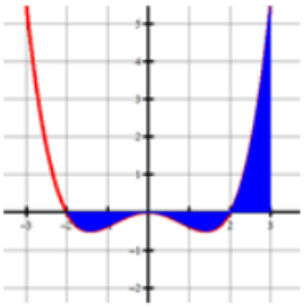
(f) What is happening at $t = 7$?

$v'(t) = 0$ means $a(t) = 0$

No acceleration, point of inflection

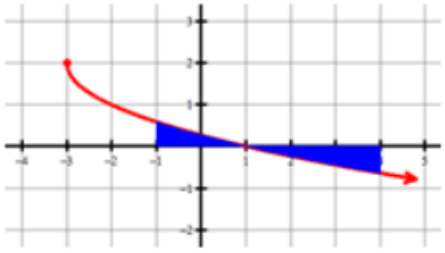
Set up a definite integral to represent the following.

4. $f(x) = \frac{x^4}{8} - \frac{x^2}{2}$



$\int_{-2}^{3} f(x)\,dx$

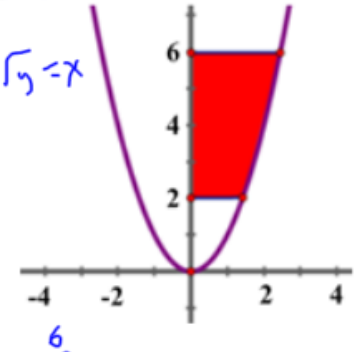
5. $y = -\sqrt{x+3} + 2$



$\int_{-1}^{4} -\sqrt{x+3} + 2 \cdot dx$

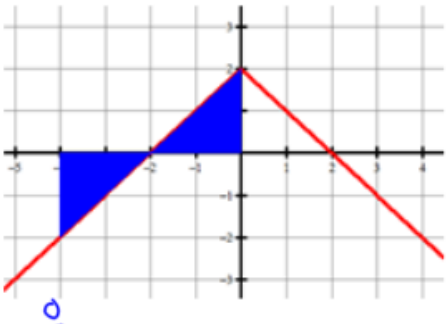
6. $\sqrt{y} = \sqrt{x^2}$

$\pm\sqrt{y} = x$



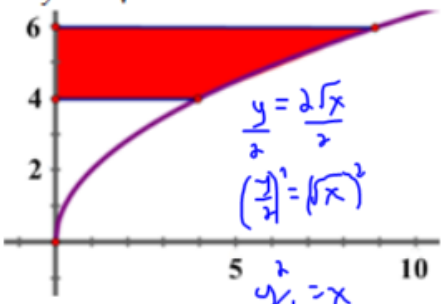
$\int_{2}^{6} \sqrt{y} \cdot dy$

7. $f(x) = -|x| + 2$



$\int_{-4}^{0} f(x)\,dx$

8. $y = 2\sqrt{x}$



$\frac{y}{2} = \frac{2\sqrt{x}}{2}$

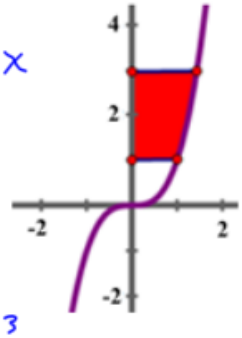
$\left(\frac{y}{2}\right)^2 = \left(\sqrt{x}\right)^2$

$\frac{y^2}{4} = x$

$\int_{4}^{6} \frac{1}{4} y^2\,dy$

9. $\sqrt[3]{y} = \sqrt[3]{x^3}$

$\sqrt[3]{y} = x$

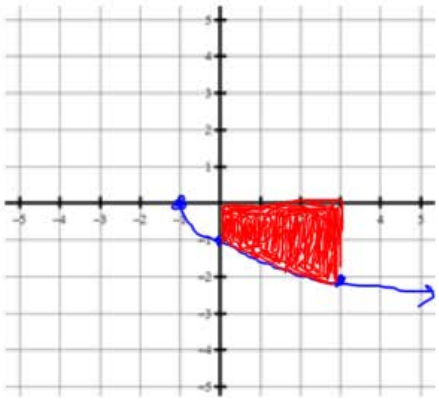


$\int_{1}^{3} \sqrt[3]{y} \cdot dy$

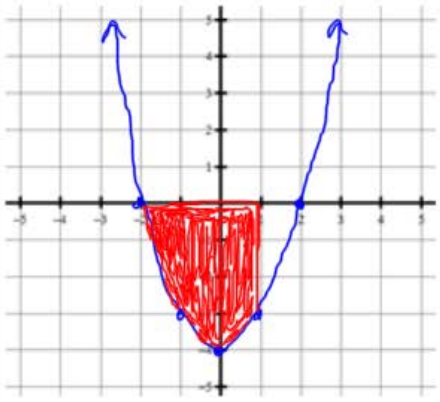
USE A GRAPHING CALCULATOR ON 10-28

Sketch a graph of the definite integral without the calculator. Evaluate with the graphing calculator.

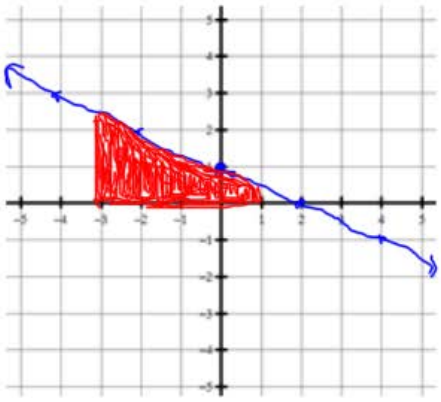
10. $\int_{0}^{3} -\sqrt{x+1}\,dx = -4.\overline{6}$



11. $\int_{-2}^{1} (x^2 - 4)dx = -9$

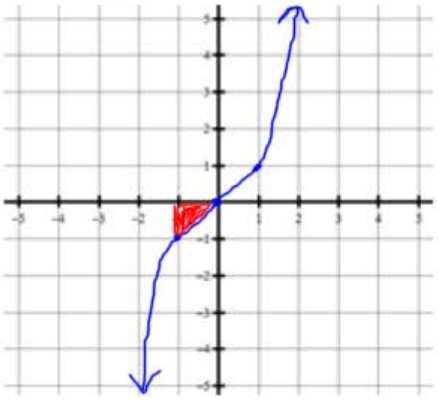


12. $\int_{1}^{-3} \left(-\frac{x}{2} + 1\right) dx = -6$

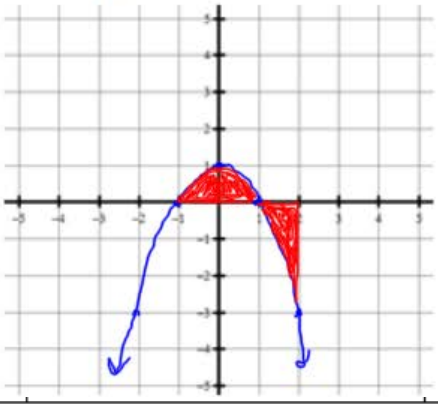


Sketch a graph of the definite integral without the calculator. Evaluate with the graphing calculator.

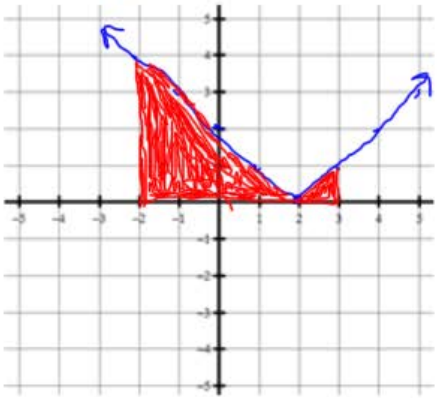
13. $\int_{-1}^{0} x^3\,dx = -0.25$



14. $\int_{-1}^{2} (1-x^2)\,dx = 0$



15. $\int_{-2}^{3} |x-2|\,dx = 8.5$



For 16-21 find each integral given *f* and *g* are continuous functions that

$\int_{-3}^{2} f(x)\,dx = 2$ $\int_{2}^{7} f(x)\,dx = -5$ $\int_{-3}^{2} g(x)\,dx = 6$

16. $\int_{2}^{7} 2f(x)\,dx$ -10

17. $4\int_{-3}^{2} f(x)\,dx$ 8

18. $\int_{-3}^{7} f(x)\,dx$ -3

19. $\int_{-3}^{2} [g(x)-f(x)]\,dx$ 4

20. $\int_{2}^{-3} g(x)\,dx$ -6

21. $-\int_{7}^{2} f(x)\,dx$ -5

For 22-27 find each integral given *f* and *g* are continuous functions that

$\int_{1}^{2} f(x)\,dx = -2$ $\int_{1}^{6} f(x)\,dx = 4$ $\int_{1}^{6} g(x)\,dx = 8$

22. $\int_{2}^{2} g(x)\,dx$ 0

23. $\int_{6}^{1} g(x)\,dx$ -8

24. $3\int_{1}^{2} f(x)\,dx$ -6

25. $\int_{2}^{6} f(x)\,dx$ 6

26. $\int_{1}^{6} [f(x)-g(x)]\,dx$ -4

27. $\int_{1}^{6} [3f(x)-g(x)]\,dx$ 4

Graph and answer the question using a graphing calculator.

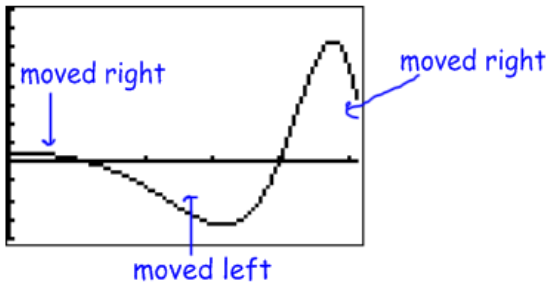
28. For $0 \le t \le 8$, a particle is moving along the x-axis. The particle's position, $x(t)$, is not explicitly given. The velocity of the particle is given by $v(t) = e^{t/4}\cos(e^{t/4})$ in meters per second.

Find $\int_0^8 v(t)\,dt$. What does this represent?

$\int_0^8 v(t)\,dt = 0.209$

represents the displacement of the particle

the particle changed position 0.209 cm



8.1 Definite Integral

TEST PREP

1. A **2. B** **3. D** **4. D** **5. C** **6. E** **7. A** **8. B** **9. C**