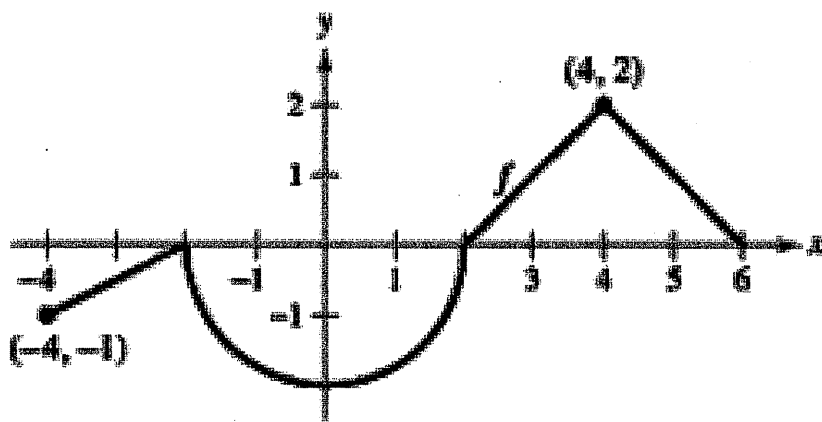


47. **Think About It** The graph of f consists of line segments and a semicircle, as shown in the figure. Evaluate each definite integral by using geometric formulas.



(a) $\int_0^2 f(x) dx$

(b) $\int_2^6 f(x) dx$

(c) $\int_{-4}^2 f(x) dx$

(d) $\int_{-4}^6 f(x) dx$

(e) $\int_{-4}^6 |f(x)| dx$

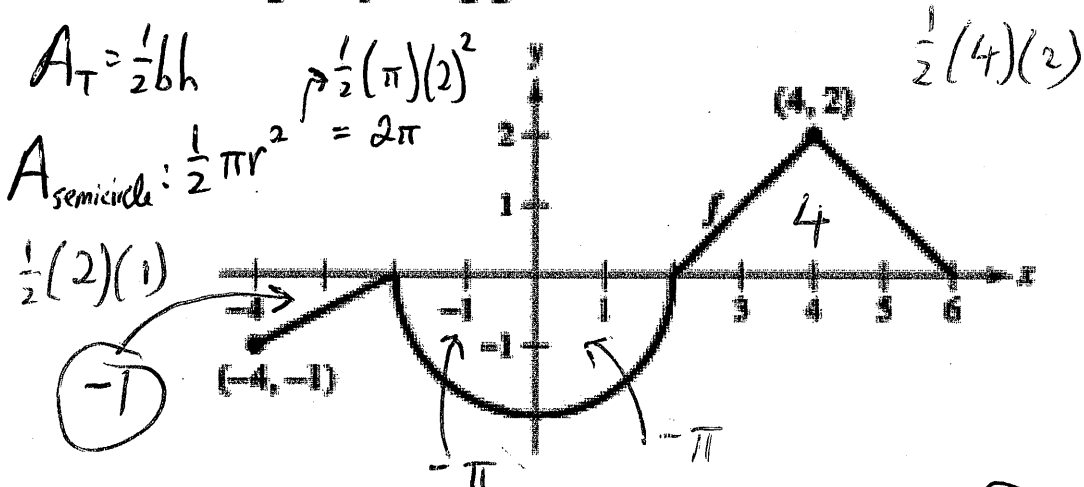
(f) $\int_{-4}^6 [f(x) + 2] dx$

$$\text{Ex. 2) } \int_{-1}^4 |x - 3| dx$$

$$\text{Ex. 3 } \int_{-2}^5 |2x - 3| dx$$

Key

47. **Think About It** The graph of f consists of line segments and a semicircle, as shown in the figure. Evaluate each definite integral by using geometric formulas.



- (a) $\int_0^6 f(x) dx = -\pi$
- (b) $\int_2^6 f(x) dx = 4$
- (c) $\int_{-4}^2 f(x) dx = -2\pi - 1$
- (d) $\int_{-4}^6 f(x) dx = 3 - 2\pi$
- (e) $\int_{-4}^6 |f(x)| dx = 2\pi + 5$
- (f) $\int_{-4}^6 [f(x) + 2] dx$

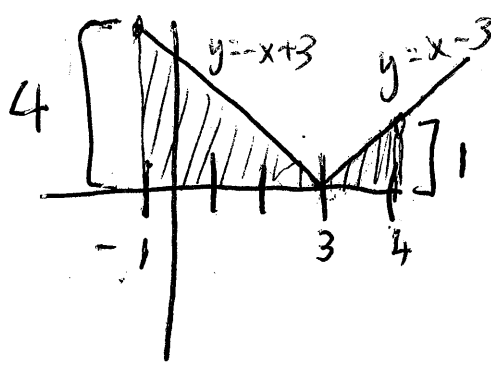
$$\int_{-4}^6 f(x) dx + \int_{-4}^6 2 dx$$

\downarrow

$$3 - 2\pi + 12 - (-8)$$

$$23 - 2\pi$$

Ex. 2) $\int_{-1}^4 |x-3| dx$



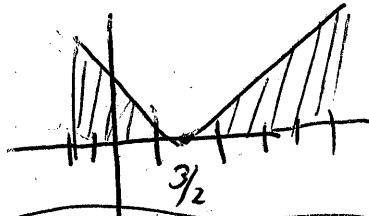
$$|x-3| = \begin{cases} x-3, & x \geq 3 \\ -(x-3), & x < 3 \end{cases}$$

$\frac{1}{2}bh$

$$\frac{1}{2}(4)(4) + \frac{1}{2}(1)(1)$$

$$8 + \frac{1}{2} = \boxed{8.5}$$

Ex. 3) $\int_{-2}^5 |2x-3| dx$



$$2x-3=0$$

$$x = \frac{3}{2}$$

$$|2x-3| = \begin{cases} 2x-3, & x > \frac{3}{2} \\ -(2x-3), & x < \frac{3}{2} \end{cases}$$

$$\int_{-2}^{\frac{3}{2}} -2x+3 dx + \int_{\frac{3}{2}}^5 2x-3 dx$$

$$\left[-\frac{2x^2}{2} + 3x \right]_{-2}^{\frac{3}{2}} + \left[\frac{2x^2}{2} - 3x \right]_{\frac{3}{2}}^5$$

$$-\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) - \left[(-2)^2 + 3(-2)\right] + 5^2 - 3(5) - \left[\left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right)\right]$$

$$12.25 + 12.25 = \boxed{24.5}$$