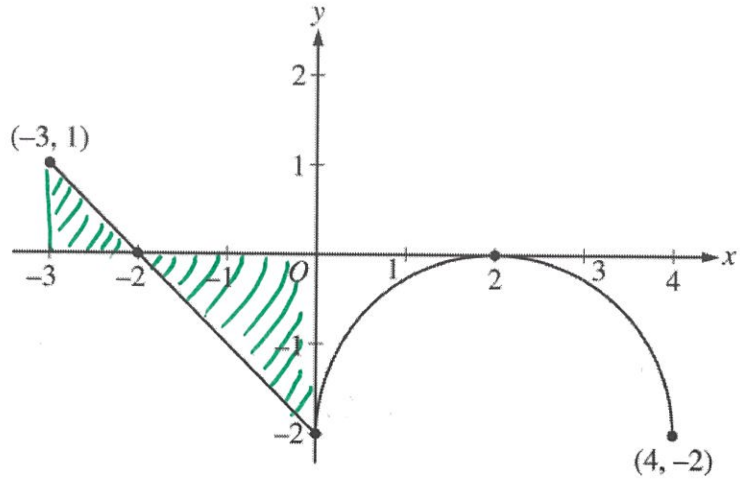


Graph of $g(x)$

1. Let g be the function, given by the graph above, defined on the closed interval $-3 \le x \le 4$ which consists of one line segment and a semicircle.
Let $w(x) = \int_{-3}^{x} g(t)\,dt$. Find $w(-3)$ and $w(0)$.

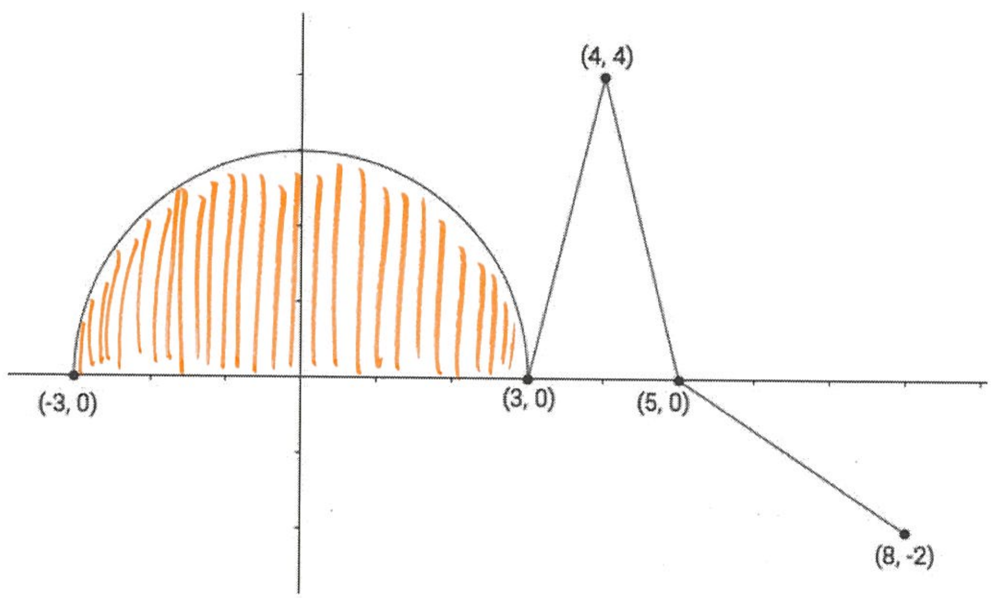
$w(-3) = \int_{-3}^{-3} g(t)\,dt$

$\boxed{w(-3) = 0}$

$w(0) = \int_{-3}^{0} g(t)\,dt = \frac{1}{2}(1)(1) + \frac{1}{2}(2)(-2)$

$= \frac{1}{2} - 2$

$\boxed{w(0) = -\frac{3}{2}}$



Graph of $f(x)$

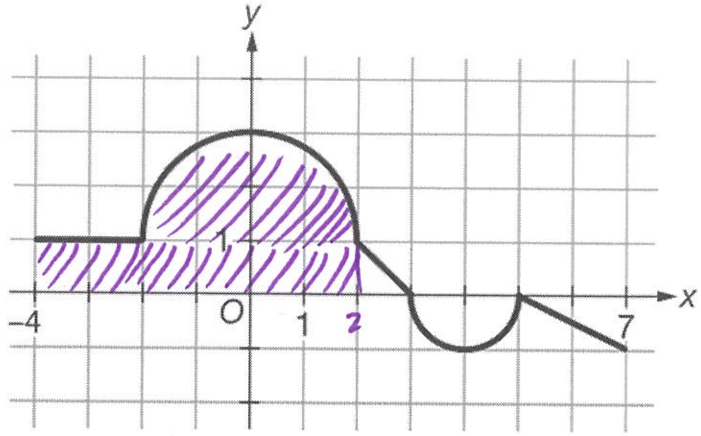
2. The function f is defined on the closed interval $[-3,8]$ and is given by the graph above which consists of three line segments and a semicircle.
Let h be the function defined by $h(x) = x - \int_{x-3}^{3} f(t)\,dt$. Find $h(0)$.

$h(0) = 0 - \int_{-3}^{3} f(t)\,dt$

$= -\int_{-3}^{3} f(t)\,dt$

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

$\boxed{h(0) = -\frac{9\pi}{2}}$



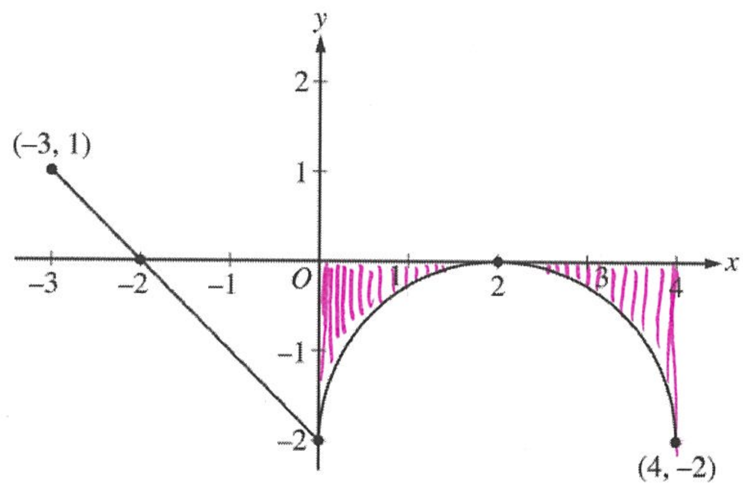
Graph of $h(x)$

3. The function h is defined on the closed interval $[-4,7]$ and is given by the graph above which consists of three line segments and two semicircles.
Let f be the function defined by $f(x) = \int_x^2 h(t)\,dt$. Find $f(-4)$.

$$f(-4) = \int_{-4}^{2} h(t)\,dt$$

$$= 6(1) + \tfrac{1}{2}\pi(2)^2$$

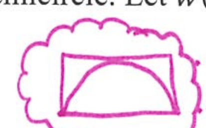
$$\boxed{f(-4) = 6 + 2\pi}$$



Graph of $g(x)$

4. Let g be the function, given by the graph above, defined on the closed interval $-3 \le x \le 4$ which consists of one line segment and a semicircle. Let $w(x) = \int_0^x g(t)\,dt$. Find $w(4)$.

$$w(4) = \int_0^4 g(t)\,dt$$

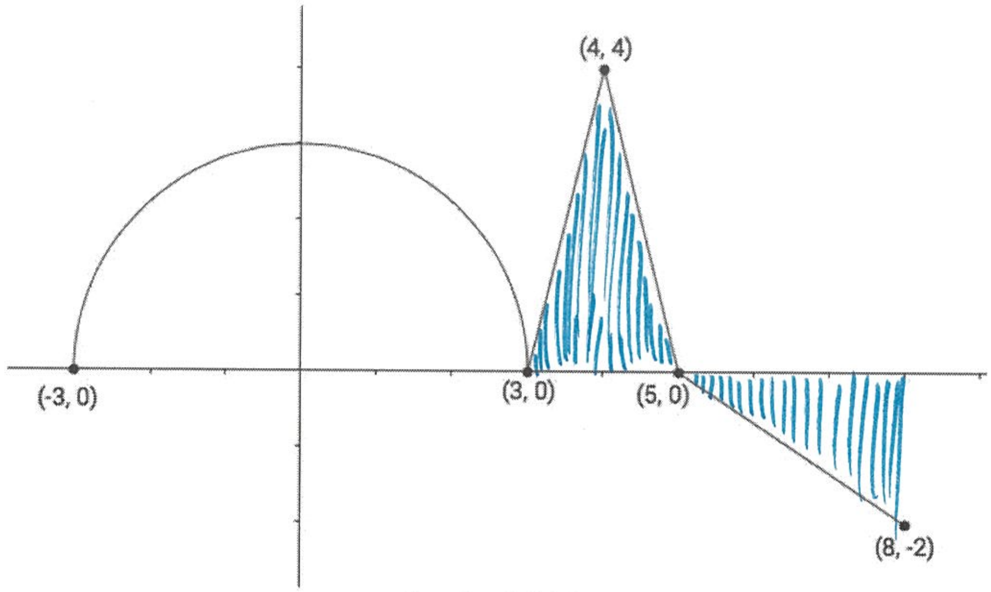


☺ rectangle - semicircle

$$= -\left(4(2) - \tfrac{1}{2}\pi(2)^2\right)$$

$$= -(8 - 2\pi)$$

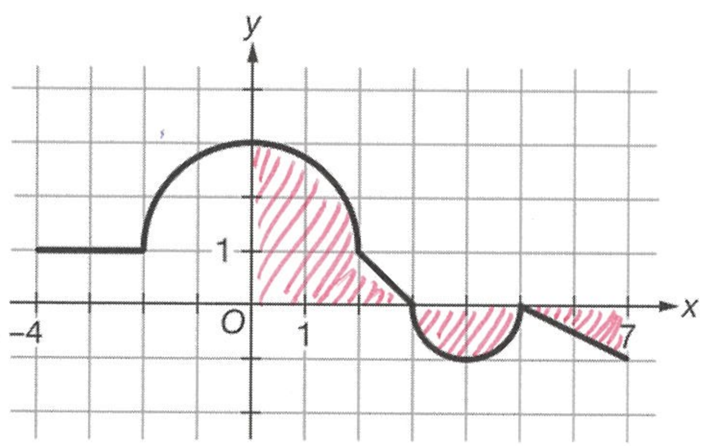
$$\boxed{w(4) = -8 + 2\pi}$$



Graph of $f(x)$

5. The function f is defined on the closed interval $[-3,8]$ and is given by the graph above which consists of three line segments and a semicircle.
Let h be the function defined by $h(x) = x - \int_3^{x-4} f(t)\,dt$. Find $h(12)$.

$$h(12) = 12 - \int_3^8 f(t)\,dt$$
$$= 12 - \left(\tfrac{1}{2}(2)(4) + \tfrac{1}{2}(3)(-2)\right)$$
$$= 12 - (4 - 3)$$
$$= 12 - 1$$
$$\boxed{h(12) = 11}$$



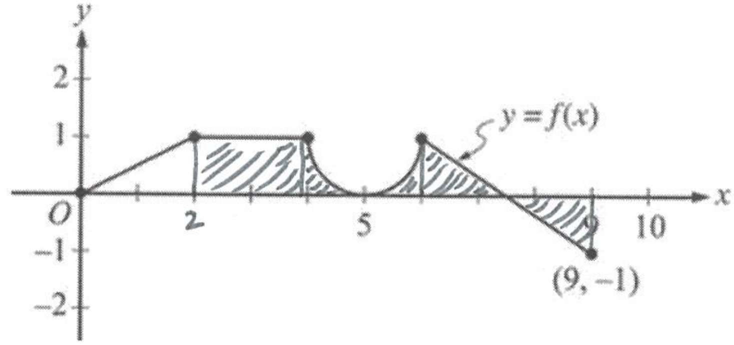
Graph of $h(x)$

6. The function h is defined on the closed interval $[-4,7]$ and is given by the graph above which consists of three line segments and two semicircles.
Let f be the function defined by $f(x) = \int_x^7 h(t)\,dt$. Find $f(0)$.

$$f(0) = \int_0^7 h(t)\,dt$$
$$= \tfrac{1}{4}\pi(2)^2 + 2 + \tfrac{1}{2}(1)(1) - \tfrac{1}{2}\pi(1)^2 + \tfrac{1}{2}(2)(-1)$$
$$= \pi + 2 + \tfrac{1}{2} - \tfrac{1}{2}\pi - 1$$

$\rightarrow f(0) = \pi + 2 + \tfrac{1}{2} - \tfrac{1}{2}\pi - 1$

$\boxed{f(0) = \tfrac{\pi}{2} + \tfrac{3}{2}}$



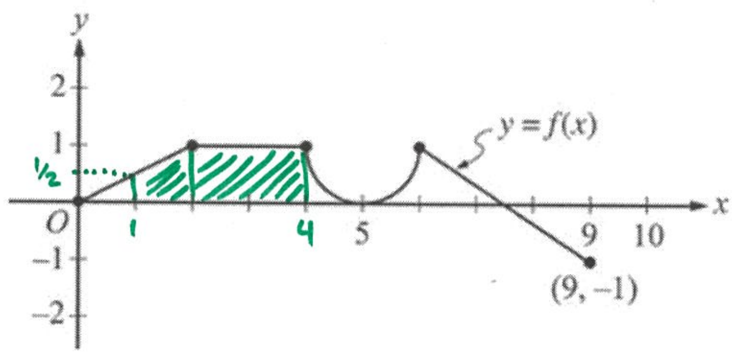
7. The function f is defined on the closed interval $[0,9]$ and is given by the graph above which consists of three line segments and a semicircle centered at point $(5,1)$.
Let g be the function defined by $g(x) = \int_2^x f(t)\,dt$. Find $g(9)$.

$g(9) = \int_2^9 f(t)\,dt$ rectangle - semicircle

$= 2(1) + 2(1) - \frac{1}{2}\pi(1)^2 + \frac{1}{2}(1.5)(1) + \frac{1}{2}(1.5)(-1)$

$= 2 + 2 - \frac{\pi}{2}$

$\boxed{g(9) = 4 - \frac{\pi}{2}}$



8. The function f is defined on the closed interval $[0,9]$ and is given by the graph above which consists of three line segments and a semicircle centered at point $(5,1)$.
Let g be the function defined by $g(x) = \int_1^x f(t)\,dt$. Find $g(4)$.

$g(4) = \int_1^4 f(t)\,dt$ trapezoid ... or triangle rectangle

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

$= \frac{1}{2}(\frac{3}{2}) + 2$

$= \frac{3}{4} + 2$

$g(4) = \frac{3}{4} + \frac{8}{4}$

$\boxed{g(4) = \frac{11}{4}}$