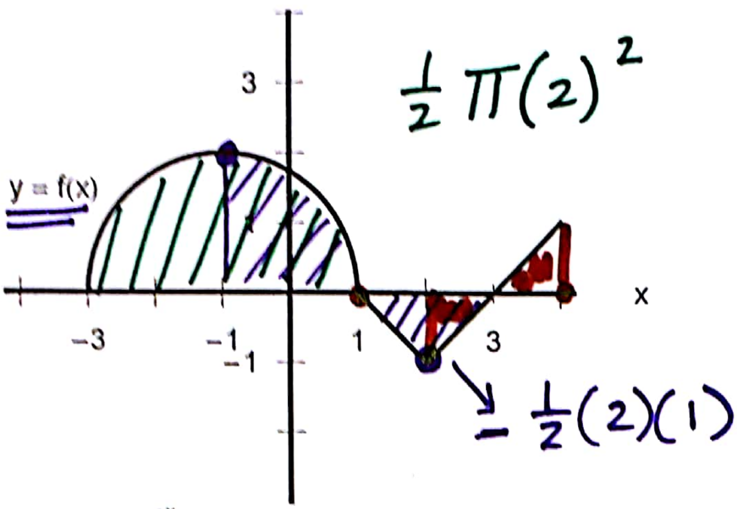
5. The graph of a function f consists of a semicircle and two line segments as shown below.



Let $g(x) = \int_1^x f(t)\,dt$

(a) Find g(1)

$\int_1^1 f(t)dt = 0$

(b) Find g(3)

$\int_1^3 f(t)dt = -1$

(c) Find g(-1)

$\int_1^{-1} f(t)dt = -\int_{-1}^{1} f(t)dt$ $-\pi$

(d) Find all values of x on the open interval (-3, 4) at which g has a local minimum.

$\frac{d}{dx}\int_1^x f(t)\,dt = f(x) = 0$

$x=-3$
$x=1$
$x=3$

$g'(x) = f(x)$

$x=3$ b/c $f(x)$ goes neg to pos

(e) Write an equation for the line tangent to the graph of g at x = -1.

slope: $f(x)$ at $x=-1$ $f(-1) = 2$

point: $(-1, -\pi)$ $g(-1) = -\pi$

$y+\pi = 2(x+1)$

(f) Find the x-coordinate of each point of inflection of the graph of g on the open interval (-3, 4).

1st der. = $f(x)$

2nd der. = $f'(x)$ ⟶ changes signs

$x=2,\ x=-1$

(g) Find the range of g.

endpoints and crit. pts of $f(x)$

x	g(x)
−3	-2π
1	0
3	−1
4	$-1/2$

Range: $[-2\pi, 0]$