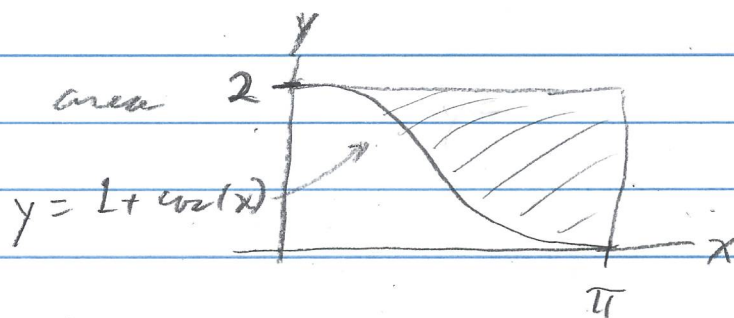


5.4. 61

Find the area



Solution

Recall that the area under  $y = f(x)$  for  $x \in [a, b]$  (where  $f(x) \geq 0$  on  $[a, b]$ )

is  $A = \int_a^b f(x) dx$ . Notice that

$f(x) = 1 + \cos(x) \geq 0$  for all  $x \in \mathbb{R}$ .

So, the area UNDER  $y = f(x)$  for  $x \in [0, \pi]$

is

$$\int_0^{\pi} (1 + \cos(x)) dx = (x + \sin(x)) \Big|_0^{\pi}$$

by the Fundamental Theorem of Calculus, Part 2

$$= ((\pi) + \sin(\pi)) - ((0) + \sin(0))$$

$$= \pi + 0 - 0 = \pi.$$

So the desired area is the area of rectangle of width  $\pi$  and height 2 MINUS the area under the curve:

$$(2)(\pi) - \pi = \boxed{\pi}. \quad \square$$