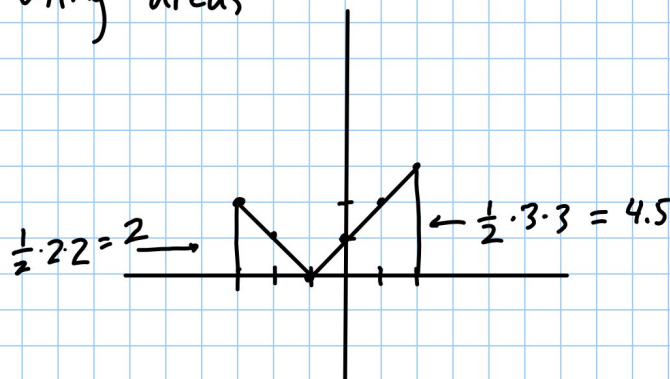


WARMUP

Calculate each integral using areas

$$1) \int_{-3}^2 |x+1| dx = 6.5$$



$$2) \int_{-4}^4 \sqrt{16-x^2} dx = \frac{1}{2} \pi \cdot 4^2 = 8\pi$$

$$y = \sqrt{a^2 - x^2}$$

is a semicircle

centered at $(0,0)$

with $r = a$

Section 5.3 Interpretations of the Definite Integral

Definite Integral of a Rate Gives Total Change

If $v(t)$ is the velocity in ft/sec, then

$\int_1^2 v(t) dt$ is the total change in distance

from $t=1$ to $t=2$ seconds

units $\int_1^2 v(t) dt$ are $\frac{\text{ft}}{\text{sec}} \cdot \text{sec} = \text{ft}$

$\underbrace{\quad}_{\text{ft/sec}} \quad \underbrace{\quad}_{\text{sec}}$

$$F(b) - F(a) = \text{total change in } F \text{ from } t=a \text{ to } t=b = \int_a^b F'(t) dt$$

ex 3 p240

$$P = f(t) = 67.38(1.026)^t$$

t = # of years since 1980

avg. population from 2000 to 2020

$$\begin{array}{ccc} \uparrow & & \uparrow \\ t=20 & & t=40 \end{array}$$

$$\text{avg. pop. on } [20, 40] = \frac{1}{40-20} \int_{20}^{40} 67.38(1.026)^t dt = \frac{1}{20} (2942.66)$$

$$\text{fnInt}(67.38 * 1.026^x, x, 20, 40)$$

= 147.1 million

p242-243

1, 3, 5, 10, 12, 23