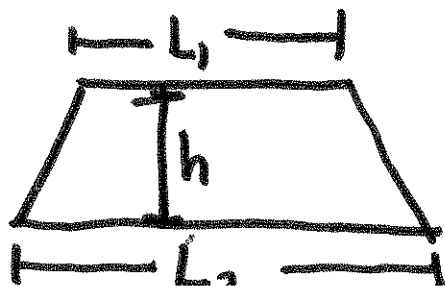


Announcements

- HW8 due tonight
- Quiz 8 out; due Tuesday
- O.H Today: 3pm - 4pm
- Starting next week, Friday O.H. move to 10am - 11am

Warm-up: A barrel with 24 liters of water develops a leak. After t seconds, the water drains at a rate of $5 - \frac{1}{2}t$ liters per second. How much water remains after 6 seconds?

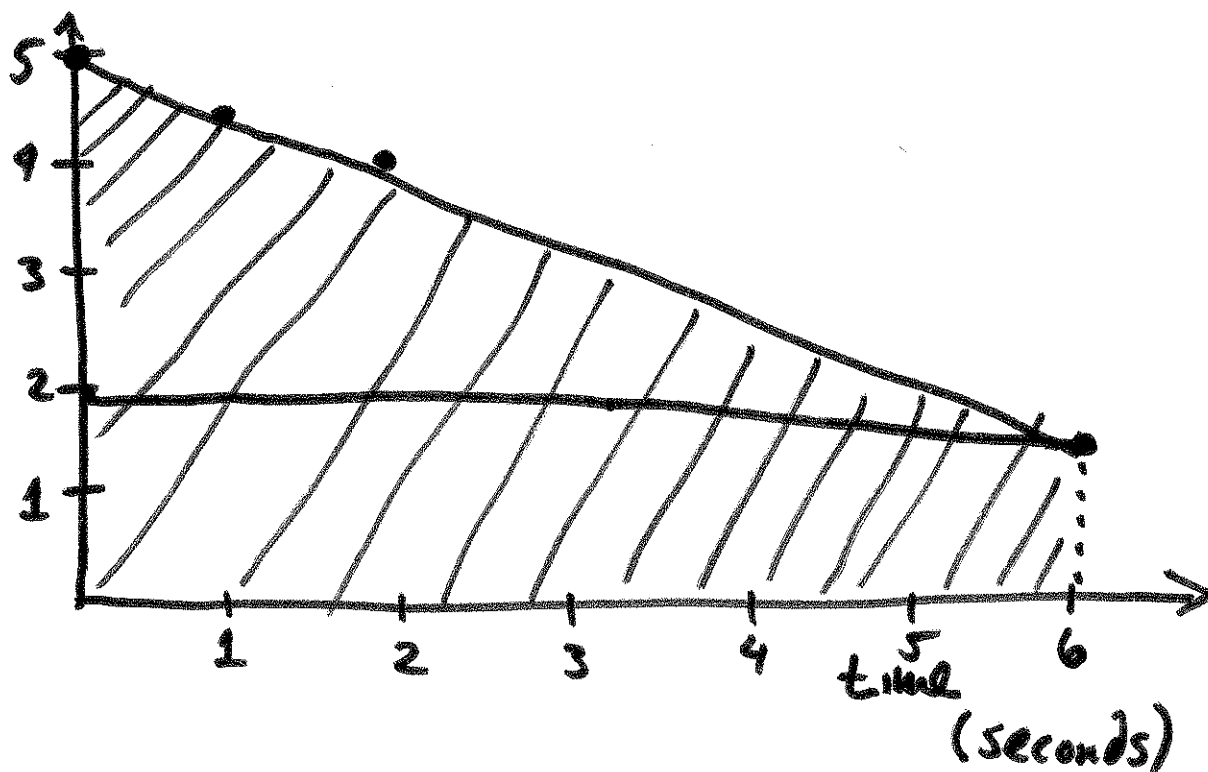
Hint:



$$\text{Area} = h \cdot \frac{1}{2}(L_1 + L_2)$$

Soln:

Rate of
Leak
(L/sec)



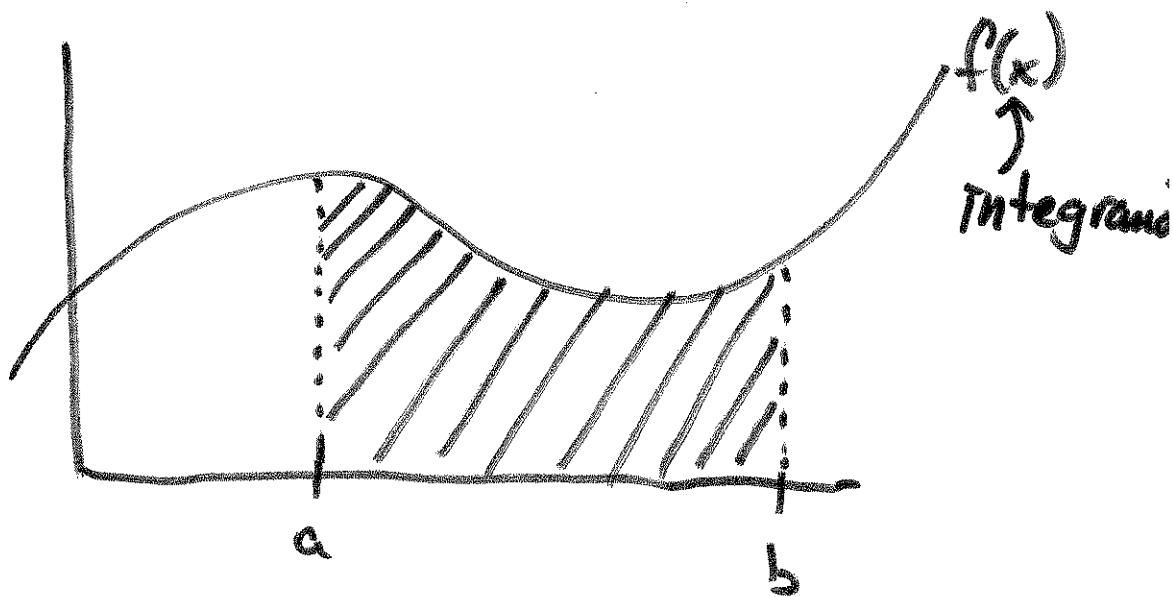
$$\begin{aligned}\text{Total change in water} &= \text{Area} \\ &= 6 \cdot \frac{1}{2}(5+2) \\ &= 3 \cdot 7 = 21 \text{ Liters} \\ \bullet \text{ Water left in barrel} &= 24 - 21 = \boxed{3 \text{ Liters}}\end{aligned}$$

5.2 The definite integral.

- The definite integral of a function $f(x)$ from $x=a$ to $x=b$,

written $\int_a^b f(x) dx$,

is the ~~curve~~ area underneath the curve of f between $x=a$ and $x=b$.



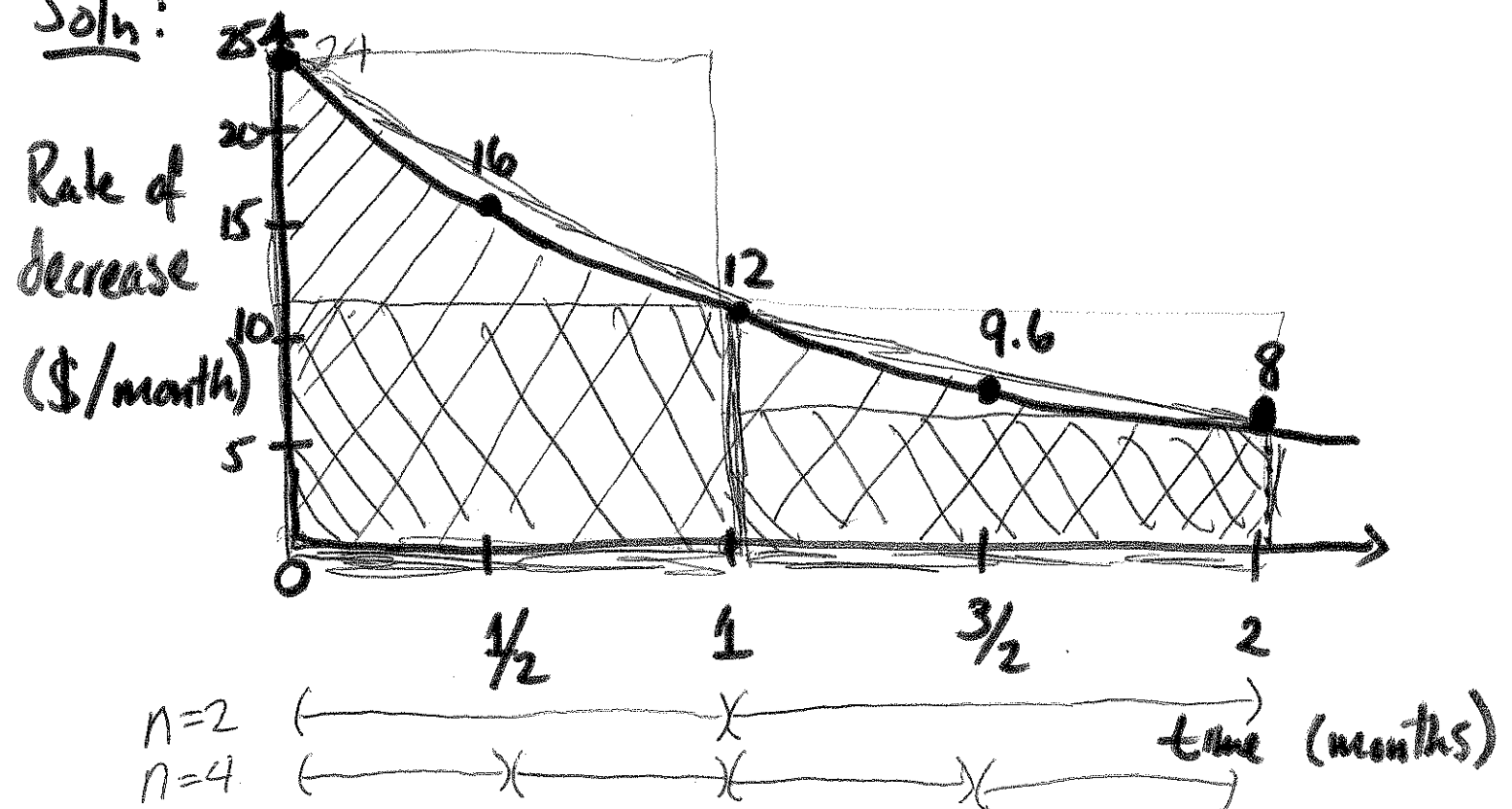
$$\int_a^b f(x) dx = \text{Area of shaded region}$$

- For now, assume f is continuous and $f(x) \geq 0$.

- a = lower limit of integration
- b = upper limit of integration
- $f(x)$ is called the integrand.

Example: The price of a drug is found to decrease at a rate of $\frac{24}{1+t}$ dollars per month after t months since its release. Write an integral ~~which~~ whose value is the total decrease in price after 2 months.

Soln:



$$\text{Total Decrease in price} = \int_0^2 \frac{24}{1+t} dt$$

• Estimating a ^{Definite} Integral / Area under the curve

	Left Hand Sum	Right hand sum	Average
$n=2$	$24 \cdot 1 + 12 \cdot 1$ $= \$36$	$12 \cdot 1 + 8 \cdot 1$ $= \$20$	$\frac{1}{2}(20 + 36) = \$28$
$n=4$	$24 \cdot \frac{1}{2} + 16 \cdot \frac{1}{2}$ $+ 12 \cdot \frac{1}{2} + 9.6 \cdot \frac{1}{2}$ $= \$30.80$	$16 \cdot \frac{1}{2} + 12 \cdot \frac{1}{2}$ $+ 9.6 \cdot \frac{1}{2} + 8 \cdot \frac{1}{2}$ $= \$22.80$	$\frac{1}{2}(30.8 + 22.8) = \26.80