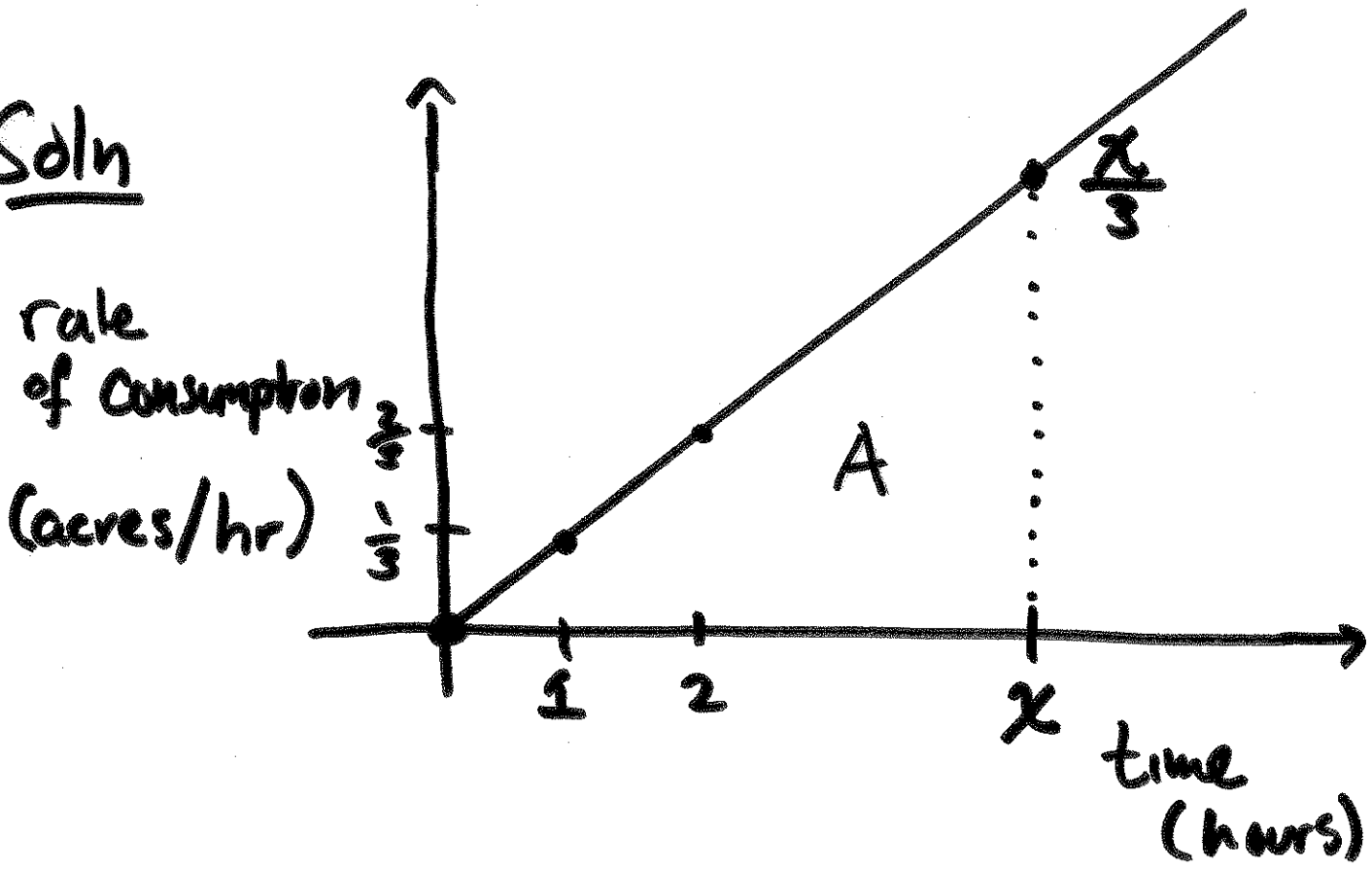
Announcements

- HW9 due Wed
- Quiz 9 in class next Fri

WARM-UP: At time $t=0$ hours, Park Rangers start a controlled forest fire to burn 24 acres. Each hour, the rate of consumption is expected to increase by $\frac{1}{3}$ acre/hr. How long will the burn take?
(Assume at time $t=0$, fire is consuming 0 acres per hour.)

Soln



- If fire burns x hours, then A acres are burned.
- $A = \frac{1}{2} \cdot b \cdot h = \frac{1}{2} x \cdot \frac{x}{3} = \frac{x^2}{6}$
- How long for 24 acres to burn?

$$\frac{x^2}{6} = 24$$

$$x^2 = 144$$

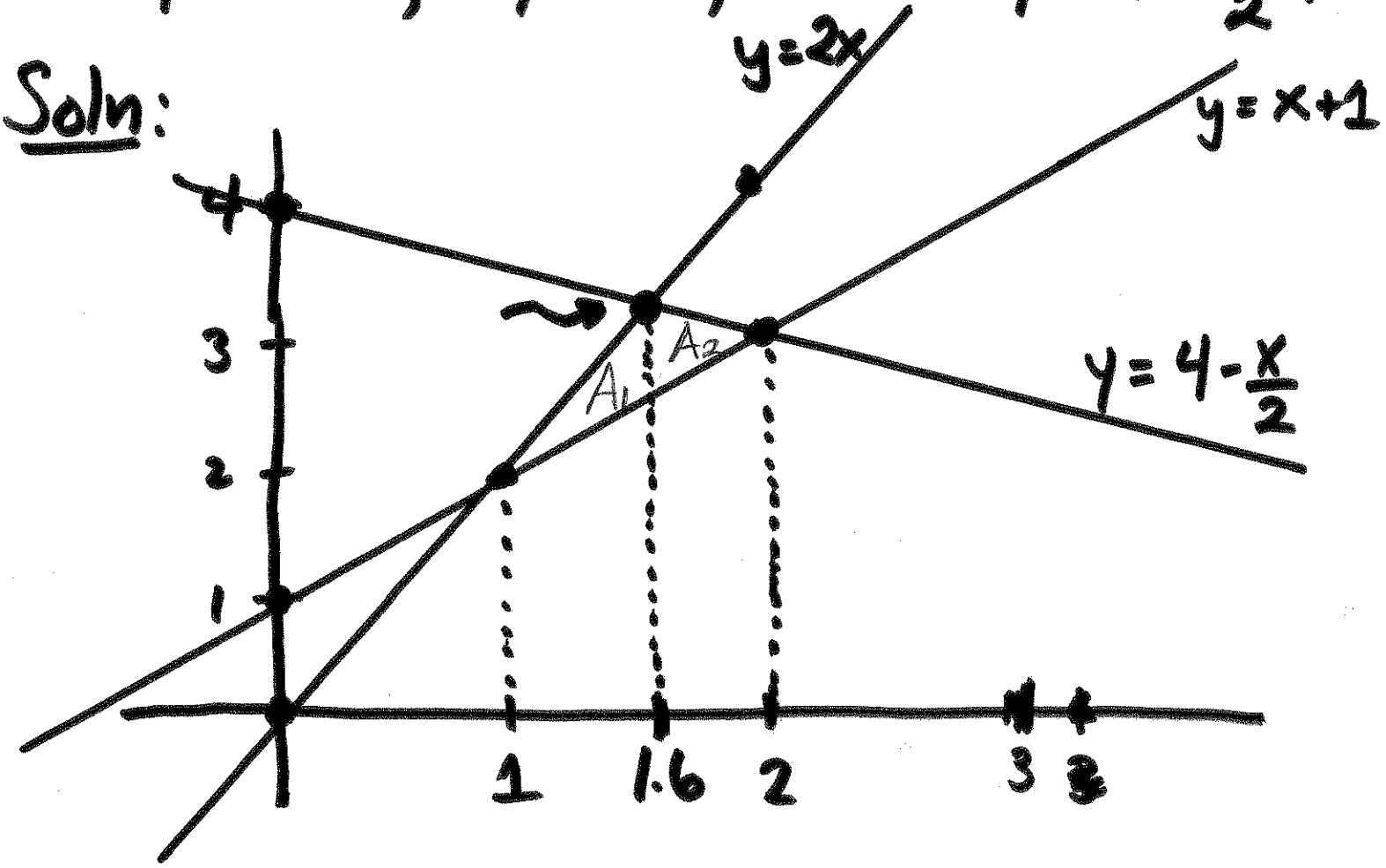
$$x = \pm 12$$

· So the fire should burn for **12 hrs**.

Ex 5.3 Find the area of the triangle bounded by the lines

$y = x+1$, $y = 2x$, and $y = 4 - \frac{x}{2}$.

Soln:



· Find location of top vertex of triangle:

$$2x = 4 - \frac{x}{2}$$

$$\frac{5}{2}x = 4$$

$$x = \frac{8}{5} = 1.6$$

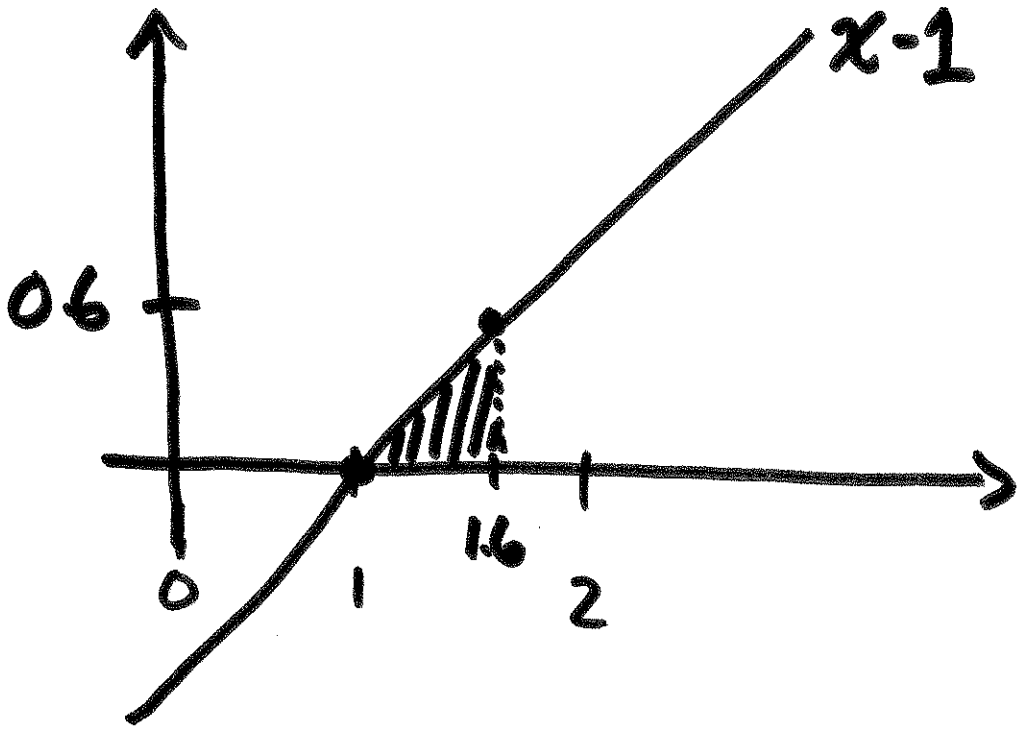
- $A_1 = \int_1^{1.6} (2x) - (x+1)\,dx$
- $A_2 = \int_{1.6}^{2} (4 - \frac{x}{2}) - (x+1)\,dx$

- Solve for A_1:

$$A_1 = \int_1^{1.6} (2x) - (x+1)\,dx$$

$$= \int_1^{1.6} 2x - x - 1\,dx$$

$$= \int_1^{1.6} x - 1\,dx$$



- $A_1 = \frac{1}{2} \cdot b \cdot h = \frac{1}{2} \cdot (0.6)(0.6)$

  $= 0.18$

- $A_2 = 0.12$ (Exercise on your own)

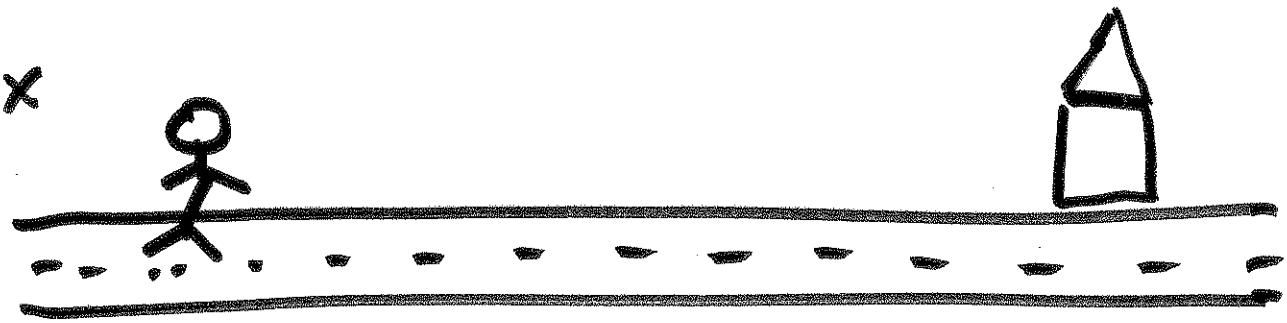
- Area of triangle $= 0.18 + 0.12 = \boxed{0.30}$

5.4

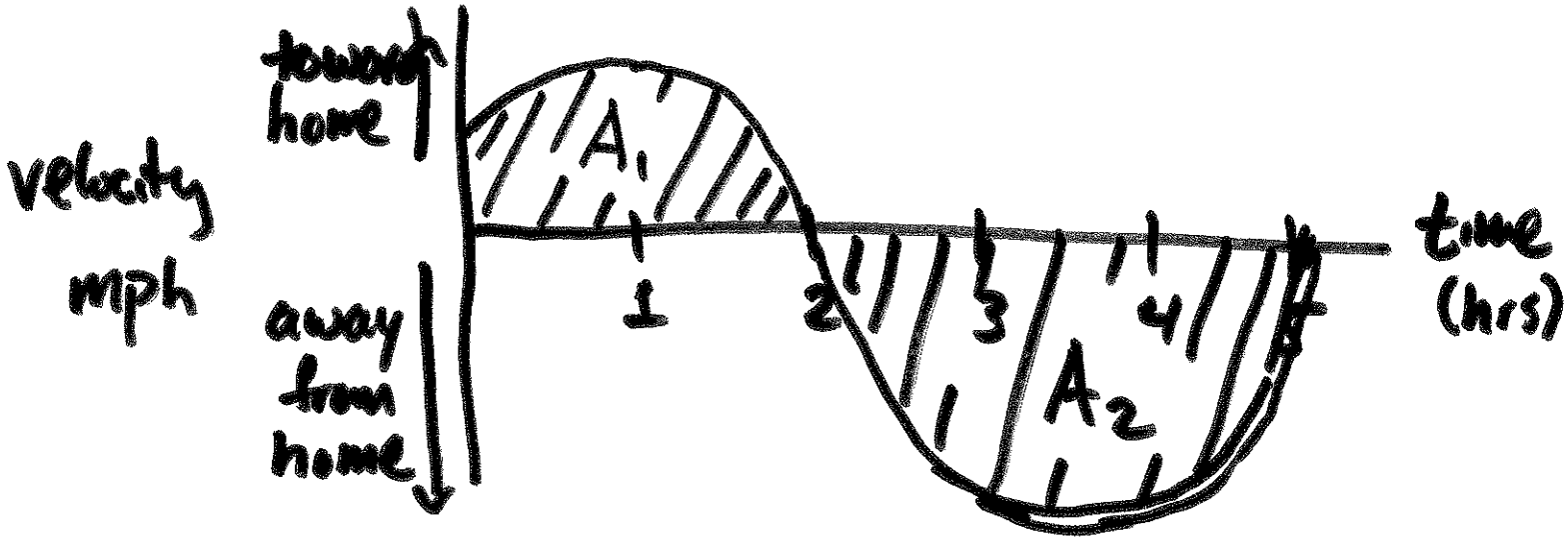
- Units of $\int_a^b f(x)\,dx$ =

(Units of $f(x)$) • (Units of x)

- Ex



- The man's velocity is given by the following graph:



- When is the man closest to home?

  $t=2$

- When is the man farthest from home? $t=5$

- A_1 = distance traveled toward home
- A_2 = distance traveled away from home
- Since $A_2 > A_1$, he is farthest at time $t=5$.