Section 2.5 Linear functions

Def A linear function has the form

$$f(x) = mx + b$$

m: slope = rate of change

b: y-intercept or initial condition $f(0) = b$.

Recall that we have already shown that avg rate of change of a linear function is always equal to the slope. This is why slope can be called **The** rate of change of $f(x) = mx + b$.

(41) A balloon is filled with air at a rate of $0.5 \frac{ft^3}{sec}$. Initially the balloon has $2\ ft^3$ of air in it.

(a) Find a linear function which models the volume of air in the balloon at t seconds.

$V(t) = 0.5t + 2$ in units ft^3

rate of change — initial condition

(b) Assuming the capacity of the balloon is $15\ ft^3$, how long until the balloon is full.

$$15 = 0.5t + 2$$

$$13 = 0.5t$$

$26 = t$ seconds

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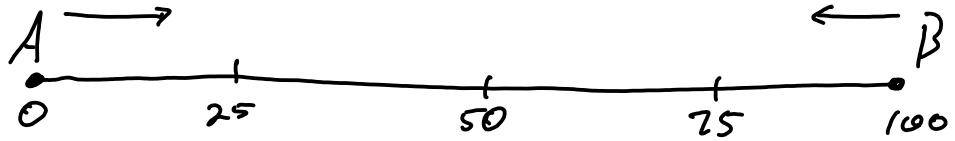
example



Car A leaves from the indicated point traveling 30 $\frac{mi}{hr}$

Car B leaves from the indicated point traveling 25 $\frac{mi}{hr}$

At what time and at which point do the cars meet?

$a(t) = 30t$ where $a(t)$ and $b(t)$ are in miles

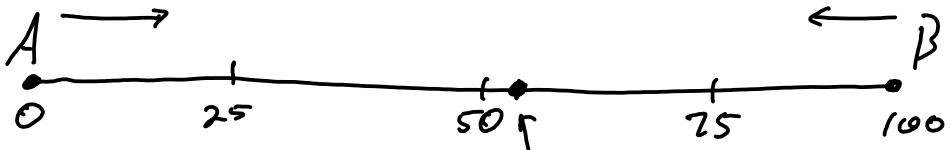
$b(t) = -25t + 100$ and t is in hrs.

Cars meet when $a(t) = b(t)$

$30t = -35t + 100$

$55t = 100$

$t = \frac{100}{55} \approx 1.818$ hours



$a\left(\frac{100}{55}\right) = 30\left(\frac{100}{55}\right) \approx 54.54$ miles