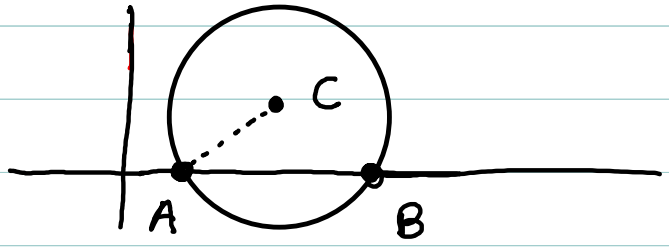
Lesson 9

Finish Chapter 6

$|ax + b|$

Midterm problems

Midterm review



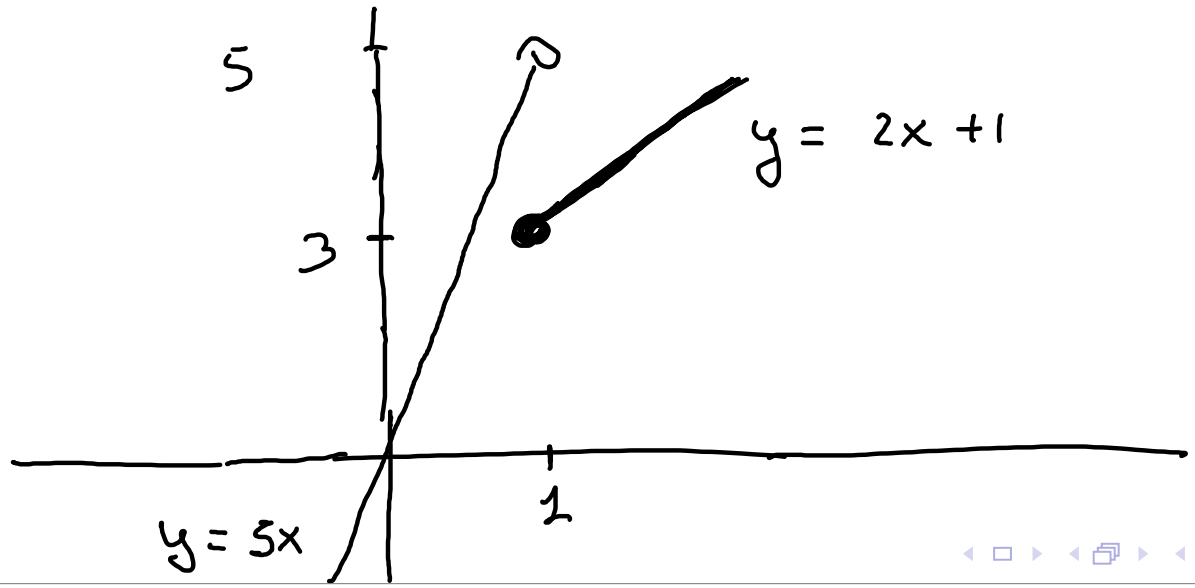
A has coordinates (1, 0)

C has coordinates (3, 2)

Find the equation of the tangent to the circle at B

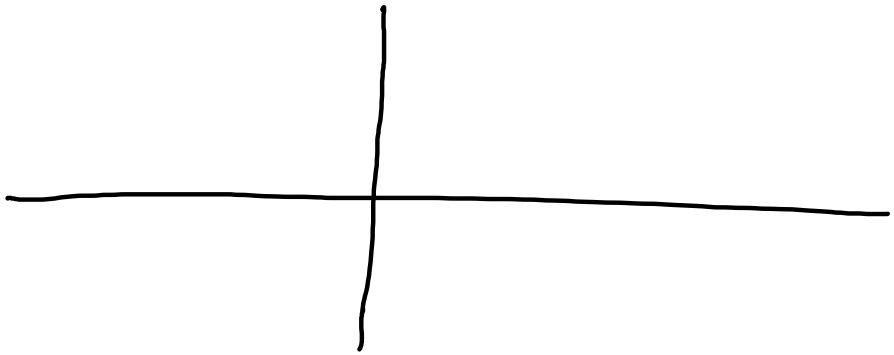
Example

$$k(x) = \begin{cases} 2x + 1 & \text{if } x \geq 1 \\ 5x & \text{if } x < 1 \end{cases}$$



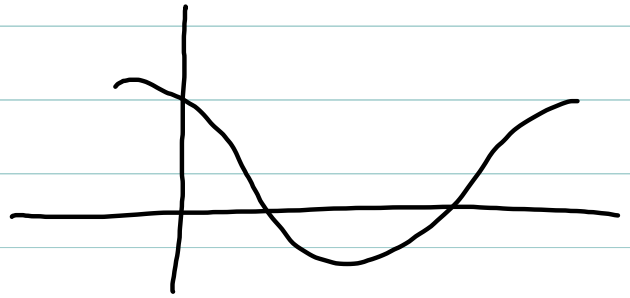
Example

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

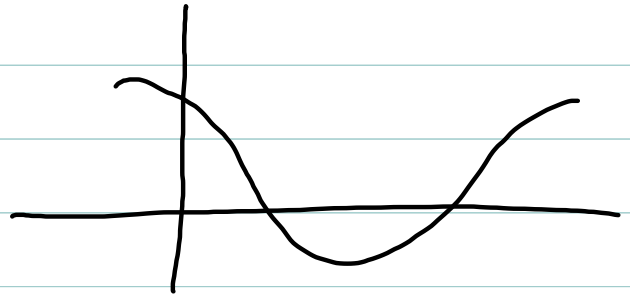


How to graph $y = |f(x)|$

Ex:



$y = f(x)$



$y = f(x)$

How to solve an equation involving $|f(x)|$

.... $|f(x)|$ ... = ...

Ann is located 3 mi east of a statue. At time t=0 she starts walking in a straight line, at a speed of 5mph, to a point located 4 mi North of the statue.Assume Ann keeps walking forever.

1. Find the parametric equations of motion for Ann.
2. Assume Bob stands still by the statue for the first 30 min, then he moves North at 6mph (forever) with a speed of 6 mph. Find all times $t \geq 0$ when Ann and Bob are 2.8 miles apart.

$d(A,B) = \sqrt{(3-3t)^2+(4t-6(t-\frac{1}{2}))^2} = 2.8$ For $t \geq 0.5$

$(3-3t)^2 + (-2t+3)^2 = 2.8^2$

$9 - 18t + 9t^2 + 4t^2 - 12t + 9 - 7.84 = 0$

$13t^2 - 30t + 10.16 = 0$ $\quad t = \frac{30 \pm \sqrt{30^2 - 4 \cdot 13 \cdot 10.16}}{2 \cdot 13} = 1.9, 0.41$

Is there a time $0 \le t \le 0.5$ that works? Ann $(3-3t, 4t)$ Bob $(0,0)$

For $0 \le t \le 0.5$

$$\sqrt{(3-3t)^2+(4t)^2} = 2.8$$

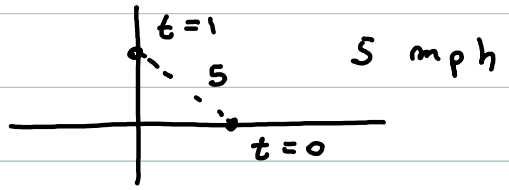
$$(3-3t)^2 + (4t)^2 = 2.8^2$$

$$9 - 18t + 9t^2 + 16t^2 - 7.84 = 0$$

$$25t^2 - 18t + 1.16 = 0$$

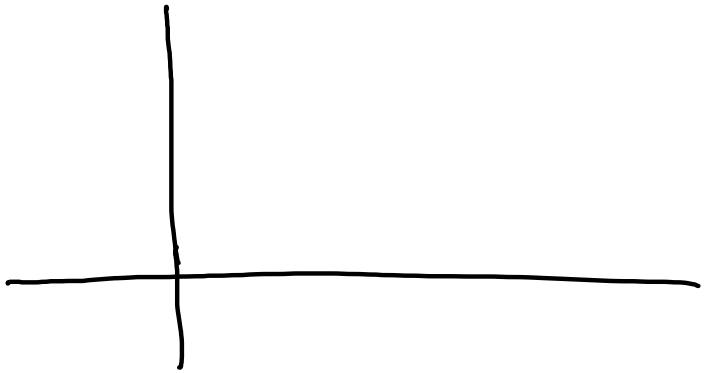
$$t = \frac{18 \pm \sqrt{18^2 - 4 \cdot 25 \cdot 1.16}}{2 \cdot 25} = 0.07, 0.65$$

Is there a time when Ann is 2.8 m from the statue?



$f(x) = |1 - 2x|$. Find a multipart formula for f, draw the graph of f and solve $f(x) = x - 3$.

1) Graph



2) Multipart formula

$|1 - 2x| =$ {

$$|1 - 2x| = x - 3$$