$y = mx + b$

$y = ax^2 + bx + c$

$y = a(x - h)^2 + k$

$y = a(x - x_1)(x - x_2)$

Unit 12 : Describing the Characteristics of Various Functions

p 12.9
2

Formulating an equation that rep. a situation

Strategy: work first with a case scenario.

x → the bill wout taxes

$x = 10\$$

y → the bill after taxes

$y = 0.15x + 1x$ (10) (10) ✓

$y = 1.15x$

$y = mx + b$

a) what type of variation is

- a line
- a first degree equation
- a linear function

Strategy

make a sketch!

b) Is this function both positive and negative?

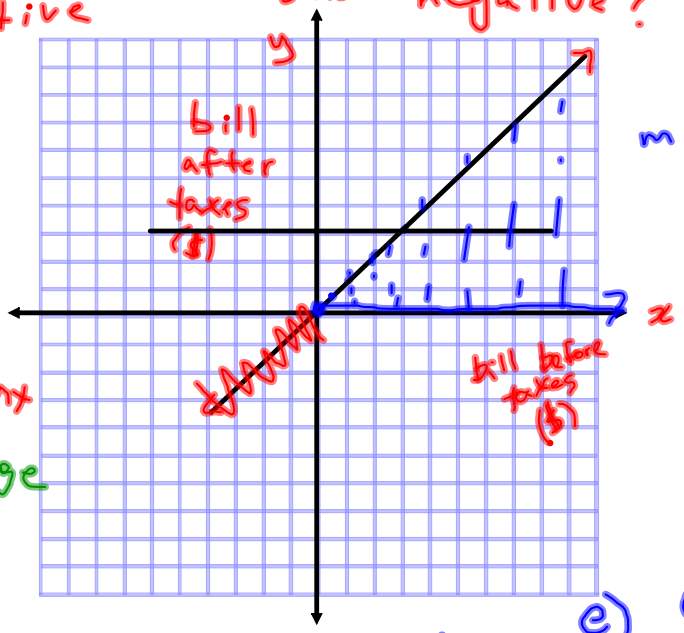
The function is just positive

$[0, \infty[$

$y = 1.15x$

$y = mx + b$

slope, y-int



$m = \frac{rise}{run} = \frac{1.15}{1}$

b) rate of change = slope

1.15

c) increasing interval

$[0, \infty[$

e) 0 (0,0)

g) domain $[0, \infty[$ Range $[0, \infty[$

$$f(x) = -\frac{1}{2}x^2 + x + 5$$

a) type of function ?

- parabola
- 2nd degree
- quadratic

b) What's the sign of this function?

Domain $]-\infty, \infty[$

Range $]-\infty, 5.5]$

$V\left(\frac{-b}{2a}, \frac{-\Delta}{4a}\right)$

$\Delta = b^2 - 4ac$

$\Delta = (1)^2 - 4\left(-\frac{1}{2}\right)(5)$

$\Delta = 11 > 0$! 2 solutions x-ints

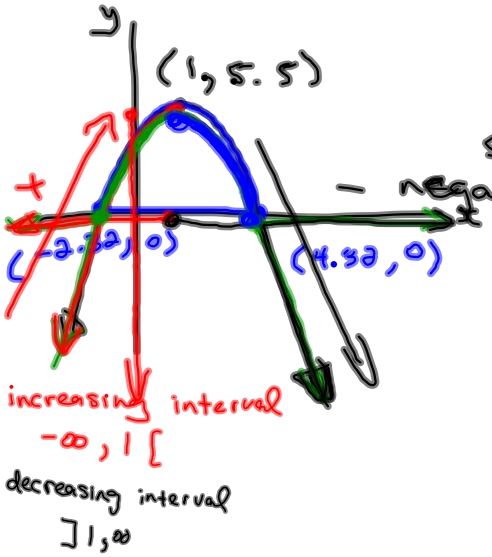
$a = -\frac{1}{2}$

$b = 1$

$c = 5$

$V\left(\frac{-1}{2\left(-\frac{1}{2}\right)}, \frac{-11}{4\left(-\frac{1}{2}\right)}\right)$

$V(1, 5.5)$



What's the positive interval of this function?

$]-2.32, 4.32[$

Over what interval is the function simultaneously positive and decreasing?

$]1, 4.32[$

What's the negative interval of the function?

$]-\infty, -2.32[\cup]4.32, \infty[$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

$$x = \frac{-1 + \sqrt{11}}{2\left(-\frac{1}{2}\right)} = -2.32$$

$$x = \frac{-1 - \sqrt{11}}{2\left(-\frac{1}{2}\right)} = 4.32$$

positive interval $[0, 6[$

negative " $[-6, 0[$

decreasing " none

increasing " $[-6, 6[$

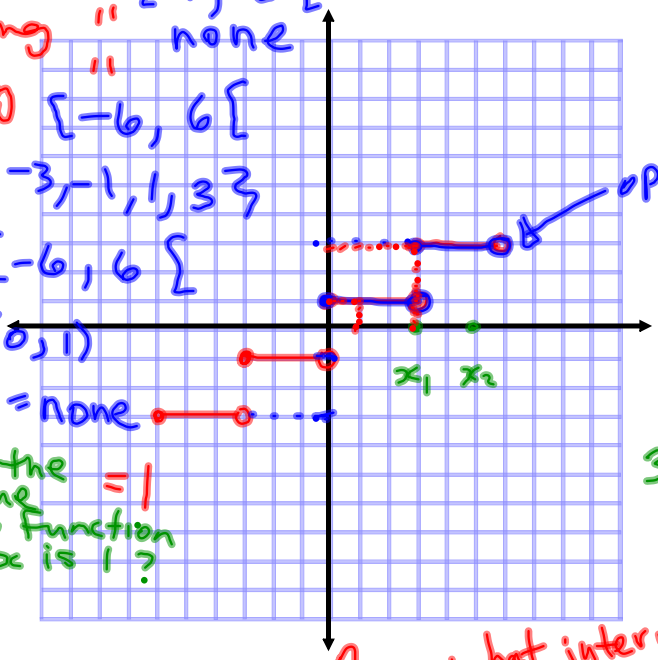
Range $= \{-3, -1, 1, 3\}$

Domain $= [-6, 6[$

y - int $= (0, 1)$

x - int(s) $=$ none

increasing if when $x_1 < x_2$ and $f(x_1) < f(x_2)$



open dot is not a part of the function

$f(1) = 1$ what is the y-value of the function when x is 1?

$f(3) = 3$

$3 < 5$ $1 > -1$ decreasing

$f(x) = x$

$y = x$

$[-6, 0[$

Over what interval is the function both negative and increasing?