Tweak your e-mail settings!

https://harryzaims.com/public_html/121-online/videos/00-Orientation/emails-settings.mp4

Section 1.1 4 Ways to Represent a Function

A function is a rule *f* that assigns to each *x* in some set (Domain) to a *y* in another set (Range).

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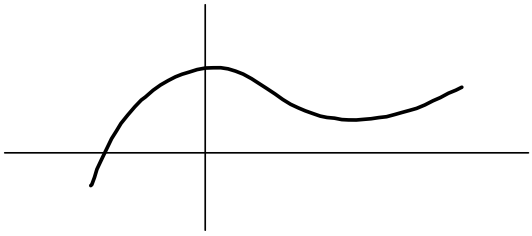
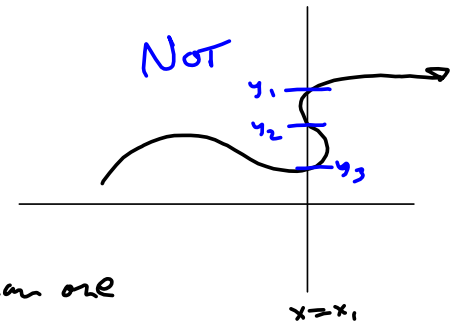




@ $x = x_1$, we have more than one y-value.

Relation

Function

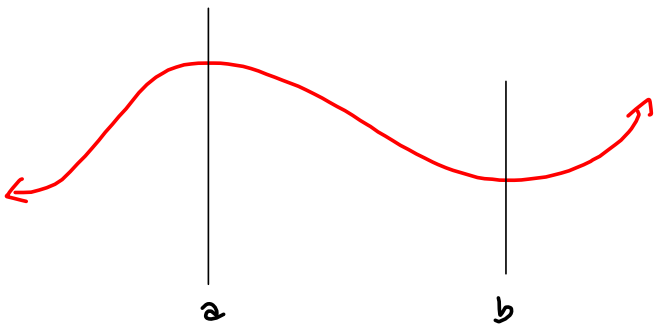
$\{(x_1,y_1),(x_1,y_2),(x_1,y_3),\dots\}$

BAD

for all
for each

f is increasing on an interval I if $\forall\ x_1 < x_2 \in I$,
we have $f(x_1) < f(x_2)$. x is independent variable - input
$y = f(x)$ is dependent variable - output

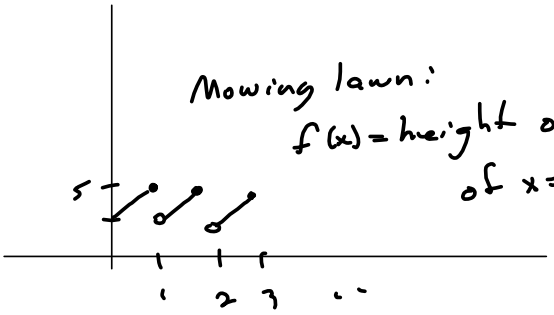
f is Decreasing on an interval I if $\forall\ x_1 < x_2 \in I$,
we have $f(x_1) > f(x_2)$



f is increasing $\forall\ x \in (-\infty, a] \cup [b, \infty)$
" " decreasing $\forall\ x \in [a, b]$

There are four possible ways to represent a function:

- verbally (by a description in words)
- numerically (by a table of values)
- visually (by a graph)
- algebraically (by an explicit formula)



Mowing lawn:
$f(x)$ = height of grass (in inches) as a function of x = # of weeks

$x^3 - y^3 = (x-y)(x^2+xy+y^2)$. Difference of Cubes

$x^3 + y^3 = (x+y)(x^2-xy+y^2)$.

$\exists$ – There is or There exists

$\ni$ – such that or so that

$\Rightarrow$ – Implies.

$\forall$ – for each or for every

1,2 Linear function:

$y = f(x) = ax+b$ Slope-Intercept

$y = m(x-x_1)+y_1$ Point-Slope, where (x_1, y_1) on line & slope $= m$.

Book's Point slope:

$m = \frac{y_2-y_1}{x_2-x_1} = m \Rightarrow$ Plug in $(x,y) = (x_2, y_2)$

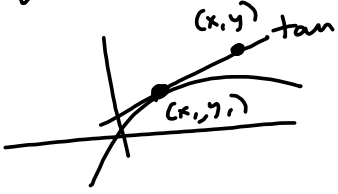
$y_2 - y_1 = m(x_2 - x_1)$

$y - y_1 = m(x - x_1)$ Book is POINT-SLOPE.

$y = m(x-x_1)+y_1$

$y = y_1 + m(x-x_1) = f(x_1) + f'(x_1)(x-x_1) =$ TANGENT LINE.

New height = old height + steepness times horizontal distance.



tangent line slope is $f'(x_1)$ = slope of curve @ $x = x_1$.

Quadratic Function

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

(h,k) = vertex

$f(x) = 3x^2 + 2x + 7$

$= 3(x^2 + \frac{2}{3}x\ \ ) + 7$

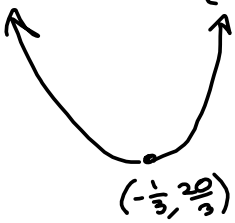
$= 3(x^2 + \frac{2}{3}x + (\frac{1}{3})^2) + 7 - 3(\frac{1}{9})$

$\frac{\frac{2}{3}}{2} = \frac{1}{3} \rightsquigarrow (\frac{1}{3})^2$

$7 - \frac{1}{3} = \frac{21-1}{3} = \frac{20}{3}$

$= 3(x+\frac{1}{3})^2 + \frac{20}{3}$

$(h,k) = (-\frac{1}{3}, \frac{20}{3})$

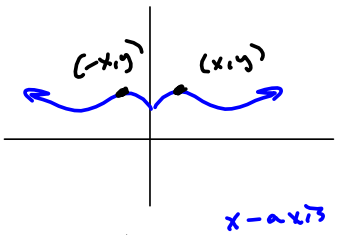


$(-\frac{1}{3}, \frac{20}{3})$

§1.2 Symmetry:

w.r.t y-axis (Even function)

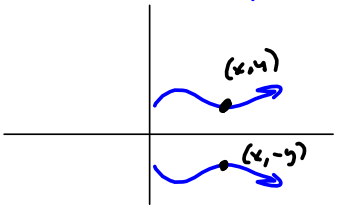
↳ with respect to



(x,y) on graph ⇒

(-x,y) " "

x-axis symmetry:



Not a Function

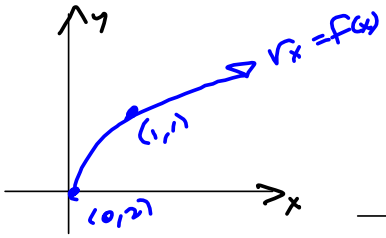
(x,y) on graph

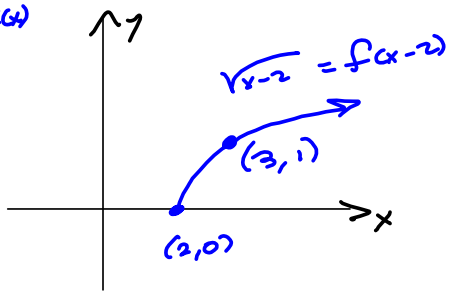
(x,-y) " "

$y = \sqrt{x-2}$

$f(x) = \sqrt{x}$

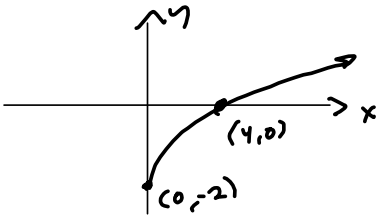
$y = f(x-2)$ Shift right 2 units.





$\sqrt{x} - 2$ Down 2

$f(x) - 2$



$\sqrt{x} - 2 = 0$

$\sqrt{x}^2 = 2^2$

$x = 4$