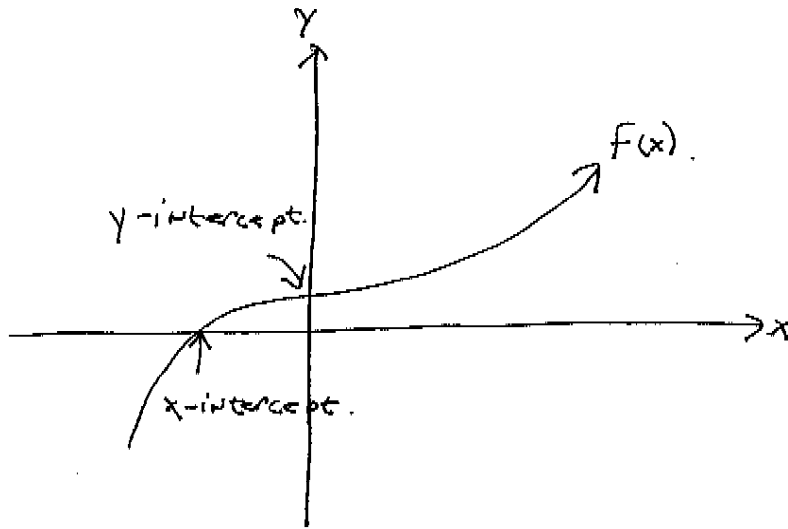


2.4a
1/4



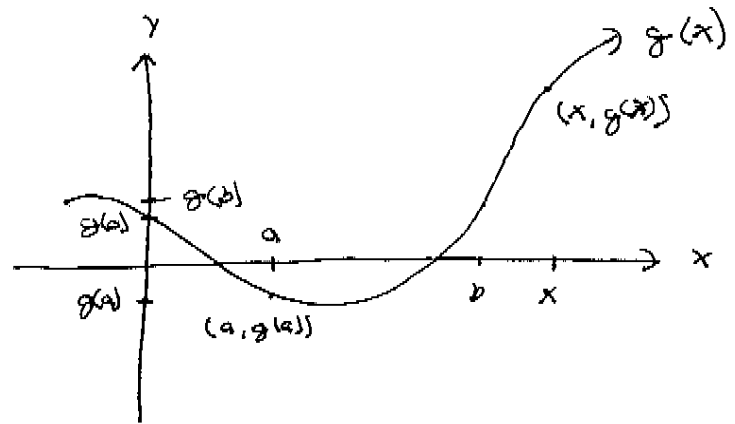
Remember

f is a function if each possible input x has one and only one corresponding output y.

Question: Can a function have more than one y-intercept?

vertical line test

Question: can a function have more than one x-intercept?



| |
|---------------|
| 2.4 or 2/4 |
|---------------|

Use transparency for the following.

$$\rightarrow \text{find } g(-1)$$

$$\rightarrow \text{find } g(2).$$

$$\rightarrow \text{find } g\left(-\frac{3}{2}\right)$$

$$\rightarrow \text{find } g(-2)$$

$$\text{Solve } g(x) = 4$$

$$g(x) = 3$$

$$g(x) = 0 \quad (\text{find } x\text{-intercepts})$$

$$g(x) = -1$$

Domain of $g(x)$: $D_g = \{x \mid -2 < x \leq 3.5\}$.

Range of $g(x)$: $R_g = \{y \mid -1 < y \leq 4\}$.

When is $g(x)$ increasing?

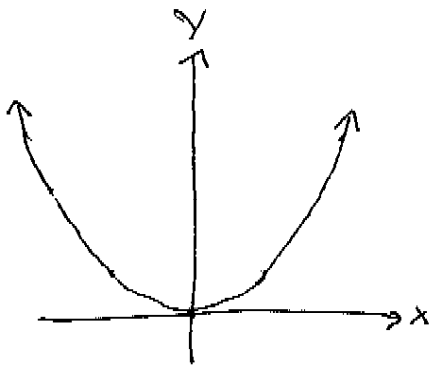
decreasing?

constant?

2.4a
3/4

Graphing Parabolas

- a) Graph $h(x) = x^2$ by point plotting.
(use table)

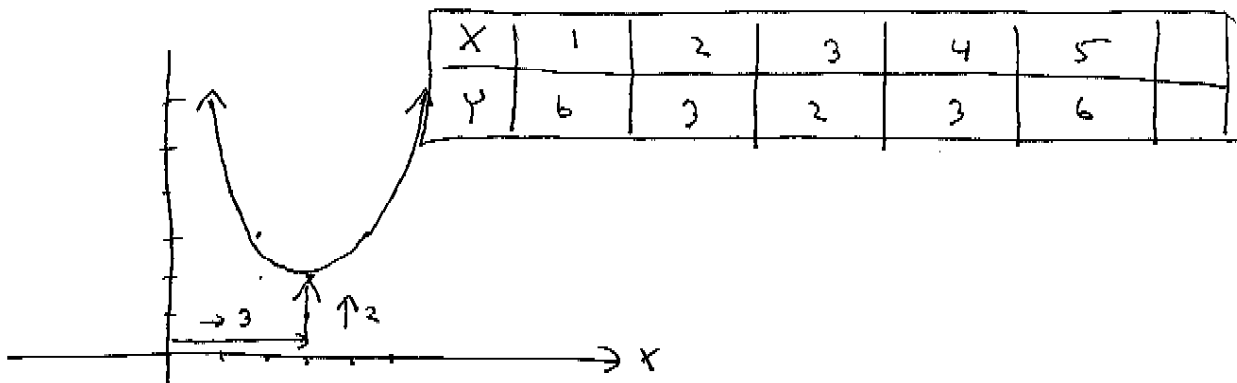


| | | | | | |
|---|----|----|---|---|---|
| X | -2 | -1 | 0 | 1 | 2 |
| Y | 4 | 1 | 0 | 1 | 4 |



- b) we can rewrite $h(x) = (x-0)^2 + 0$

- c) graph $f(x) = (x-3)^2 + 2$



- d) generally: $g(x) = a(x-h)^2 + k$ is the parabola $y = ax^2$ shifted so to have its vertex at (h,k) .

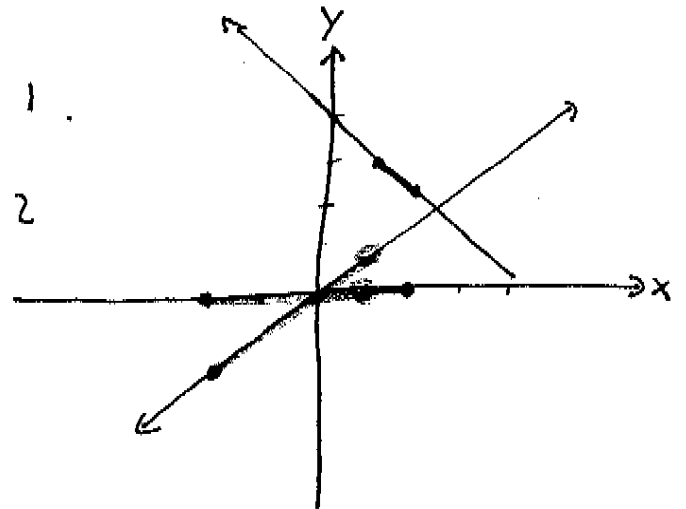
| |
|-------|
| 2.41a |
| 1/3 |

[Transparency of arbitrary $f(x)$.

- i) when is f increasing?
- ii) when is f decreasing?
- iii) when is f constant?
- iv) what is the domain of f ?
- v) what is the range of f ?

[Piecewise Defined Functions

$$f(x) = \begin{cases} x, & -2 \leq x < 1. \\ -x+4, & 1 \leq x \leq 2 \end{cases}$$



- a) graph $y = x$
and $y = -x + 4$

b) find each region on the number line.

c) keep only that part of the graph from (a).

d) generally: $g(x) = a(x-h)^2 + k$ is the parabola $y = ax^2$ shifted so as to have its vertex

2.4a
4/9

e.) graph $h(x) = -x^2 + 2x + 8$ by completing the \square .

$$h(x) = -x^2 + 2x + 8$$

$$\Rightarrow h(x) = -(x^2 - 2x) + 8$$

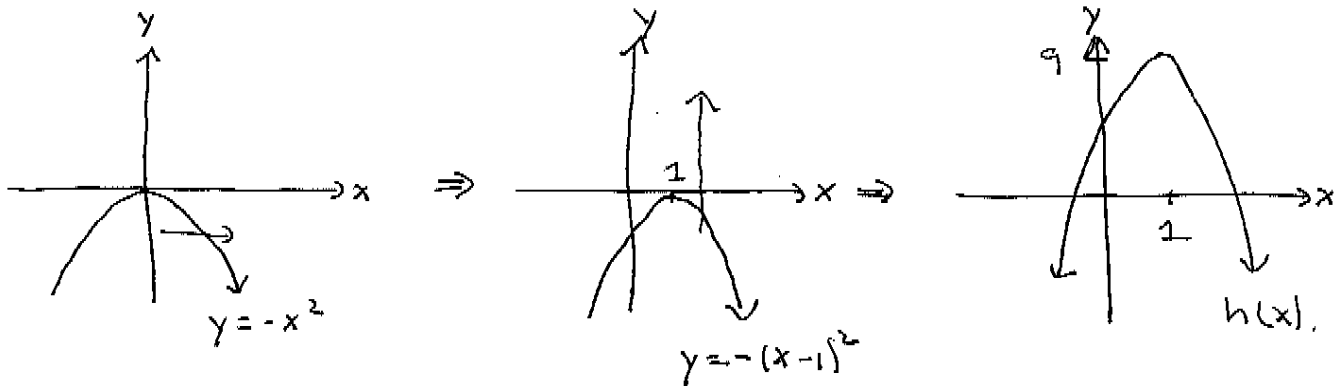
$$\Rightarrow h(x) = -(x^2 - 2x + 1) + 8 + 1$$

$$\Rightarrow h(x) = -(x-1)^2 + 9.$$

picture of

| | | |
|------|-------|------|
| | x | -1 |
| x | x^2 | $-x$ |
| -1 | $-x$ | $+1$ |

so $y = -x^2$ shifted right 1 and up 9.



| |
|------|
| 2.4b |
| 3/3 |

[Greatest Integer Function.

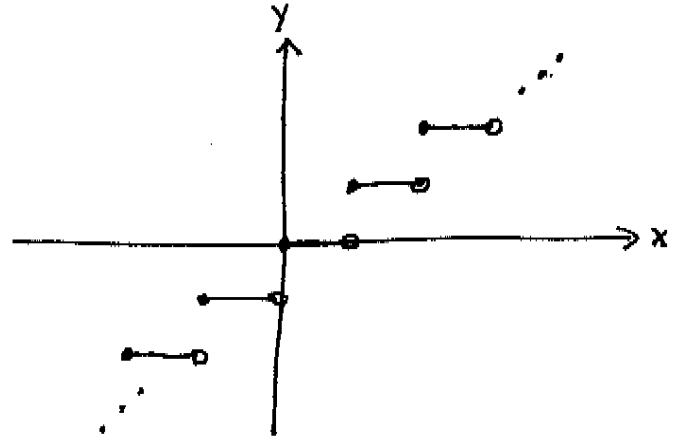
$f(x) = \llbracket x \rrbracket =$ largest integer less than or equal to x

$$f(3.45) = 3$$

$$f(7) = 7$$

$$f(-2.5) = -3$$

$$f(-\pi) = -4$$



[Toolkit Functions

- 1) constant
- 2) linear
- 3) absolute value.
- 4) quadratic
- 5) cubic
- 6) square root.
- 7) cube root.
- 8) reciprocal
- 9) sine
- 10) exponential.

GRAPH

D & R

COMMENTS.