Tuesday, September 25, 2018
6:37 PM

KEY

Precalc 1.5B Analyzing Graphs of Functions

Obj: To determine increasing and decreasing intervals of functions, relative min/max, and identify even/odd functions

Hwk: 1.5B; #31 – 35 odd, 51, 53, 57, 71, 73, 75; Check answers!

1.4 - 1.5 Quiz on FRI 9/28

Graphing calculators necessary

Do Now:

Get into groups! Do "Functions Day 2 Do Now" ditto

Recap:

In the last lesson, we examined a graph to determine:

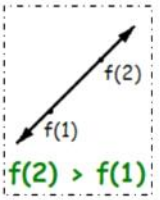
Domain: leftmost → rightmost x values

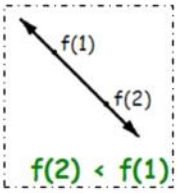
Range: bottommost → topmost y values

Zeros of function: where the graph crosses the x-axis, aka x-intercepts, solutions, roots

Today we are examining graphs to determine more:

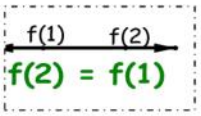
- A function f is **increasing** if $x_2 > x_1$ and $f(x_2) > f(x_1)$
  i.e. y values get "larger" as you move from left → right





- A function f is **decreasing** if $x_2 > x_1$ and $f(x_2) < f(x_1)$
  i.e. y values get "smaller" as you move from left → right

- A function f is **constant** on an interval if, for any x_1 and x_2 and $f(x_1) = f(x_2)$
  i.e. the y values don't change as you move from left → right



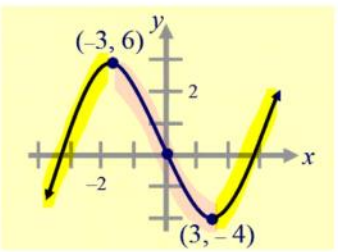
Ex. 1) Using the graph, determine the INTERVALS, if any, where the graph is

a) increasing $(-\infty, -3) \cup (3, \infty)$

b) decreasing $(-3, 3)$

c) constant

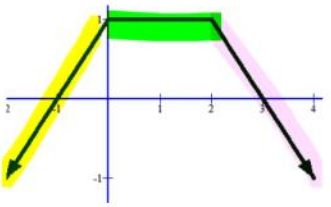
*HINT: cover up ARROWS!



*NOTE: **no interval includes turning point** (pt where graph changes direction). **It is not increasing/decreasing at that point.**

* **Always give intervals in terms of x! (moving left → rt across graph)**

Ex. 2) Using the graph, determine the INTERVALS, if any, where the graph is



a) increasing $(-\infty, 0)$

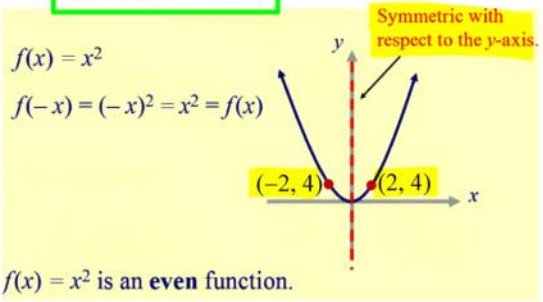
b) decreasing $(2, \infty)$

c) constant $(0, 2)$

Odd and Even Functions:

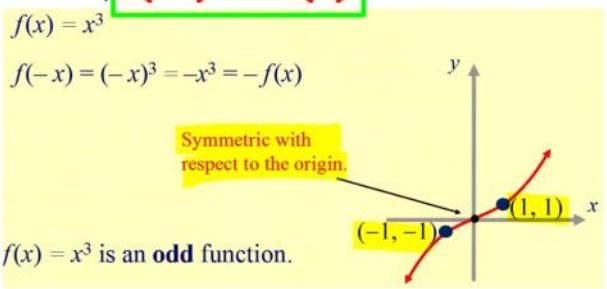
Test

- **Even** functions: for each x in its domain, **f(-x) = f(x)**
  - symmetric wrt y-axis
  - If (x, y), then (-x, y) also



Test

- **Odd** functions: for each x in its domain, **f(-x) = -f(x)**
  - symmetric wrt the origin
  - If (x, y), then (-x, -y) also



Ex. 3) Determine whether $f(x) = x^4 - |x|$ is even, odd, or neither

Test: FIND f(-x)

$$f(-x) = (-x)^4 - |-x|$$
$$= x^4 - |x|$$
$$= f(x)$$

Since f(-x) = f(x) the function is even.

∴ symmetric about y-axis

Ex. 4) Determine whether $g(x) = -\frac{x}{x^2+1}$ is even, odd, or neither

Test: Find $g(-x)$

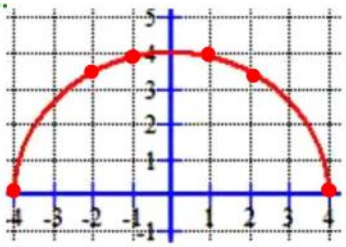
$$g(-x) = -\frac{(-x)}{(-x)^2+1} = \frac{x}{x^2+1} = -g(x)$$

Since $g(-x) = -g(x)$ the function is ODD.

∴ Symmetric about the origin.

Ex. 5) Use the graph to determine if each is even, odd, or neither

a.

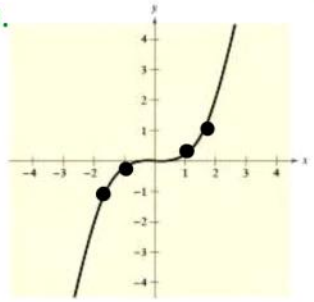


Even

* Symmetric about y-axis.

(x,y) $(-x,y)$

b.

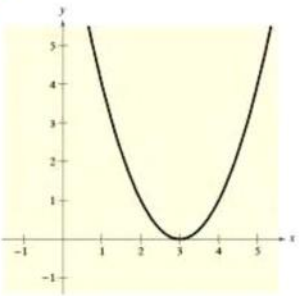


ODD

* Symmetric about the origin.

(x,y) $(-x,-y)$

c.



Neither

* Not symmetric about y-Axis or origin.

The turning point can also be a relative minimum or a relative maximum.

- *f(a)* is a **relative minimum** if the pt has the lowest y value in interval
- *f(a)* is a **relative maximum** if the pt has the highest y value in interval