

Interval Notation

Intervals

Name of interval	Notation	Inequality description	Number line representation
Finite and closed	$[a, b]$	$a \leq x \leq b$	
Finite and open	(a, b)	$a < x < b$	
Finite and half-open	$[a, b)$	$a \leq x < b$	
	$(a, b]$	$a < x \leq b$	
Infinite and closed	$(-\infty, b]$	$-\infty < x \leq b$	
	$[a, +\infty)$	$a \leq x < +\infty$	
Infinite and open	$(-\infty, b)$	$-\infty < x < b$	
	$(a, +\infty)$	$a < x < +\infty$	
Infinite and open	$(-\infty, +\infty)$	$-\infty < x < +\infty$	

Polynomial Functions

Linear

$$y = x$$

$$y = \frac{1}{2}x - 7$$

Quadratic

$$y = x^2$$

$$y = 2x^2 - 3x + 4$$

Cubic

$$y = x^3$$

$$y = x^3 - 2x + 7$$

General

$$y = ax^n + bx^{n-1} + cx^{n-2} + \dots + zx + C$$

∴

Power Function

A power function is a polynomial function of the form:

$$f(x) = ax^n$$

Polynomial functions can be odd or even, depending on the largest exponent.

odd

$$\begin{aligned} f(x) &= x \\ &= x^3 \\ &= x^5 \end{aligned}$$

Even

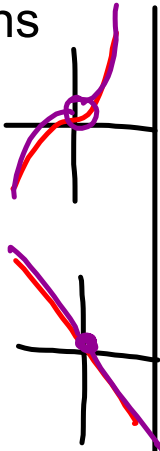
$$\begin{aligned} f(x) &= x^2 \\ &= x^4 \\ &= x^6 \end{aligned}$$

Odd Power Functions

- start in Q3
 end in Q1

or

start in Q2
 end in Q4



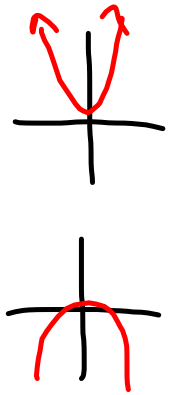
- point symmetry
 at the origin
 (0, 0)

Even Power Functions

- start Q2
 end Q1

or

start Q3
 end Q4



- line symmetry
 at $x=0$ (y-axis)

Determine if the following functions are polynomial functions or not.

$$y = \sin x$$

NO

$$y = x^3 + 2x^2 - 4$$

YES odd

$$y = 7x^7$$

YES odd

$$y = \frac{1}{x^2}$$

NO

$$y = 2x^1$$

YES odd

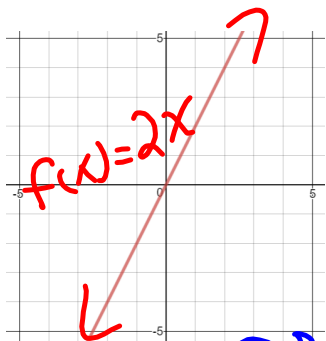
$$y = \log x$$

NO

Determine if the polynomial functions above are odd or even.

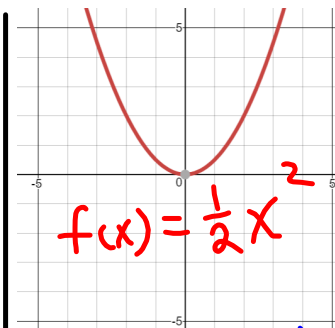
For each function

1. State the domain and range
2. Describe the end behaviour
3. Identify any symmetry



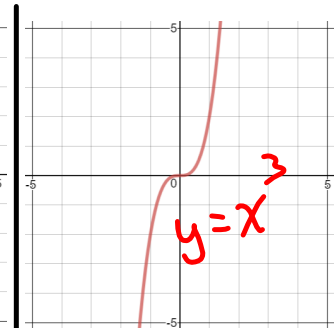
$D \rightarrow \{x \in \mathbb{R}\}$
 $\rightarrow (-\infty, \infty)$
 $R \rightarrow \{y \in \mathbb{R}\}$
 $\rightarrow (-\infty, \infty)$

Q3 to Q1
 point symmetry



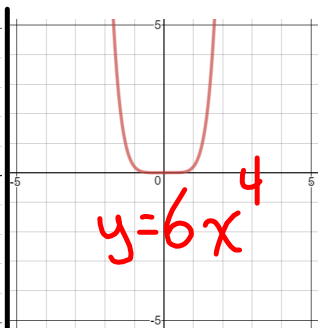
$D \rightarrow \{-\infty, \infty\}$
 $R \rightarrow [0, \infty)$
 Q2 to Q1

line symmetry



$D \rightarrow \{x \in \mathbb{R}\}$
 $\rightarrow (-\infty, \infty)$
 $R \rightarrow \{y \in \mathbb{R}\}$
 $\rightarrow (-\infty, \infty)$

Q3 to Q1
 point symmetry



$D \rightarrow \{-\infty, \infty\}$
 $R \rightarrow [0, \infty)$
 Q2 to Q1

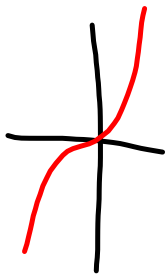
line symmetry

..

Determine the end behaviour for each function.

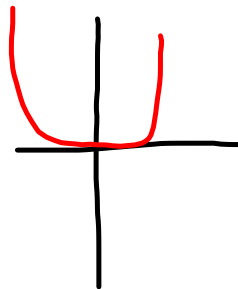
$$f(x) = 6x^3$$

Q3 to Q1



$$f(x) = \frac{1}{2}x^8$$

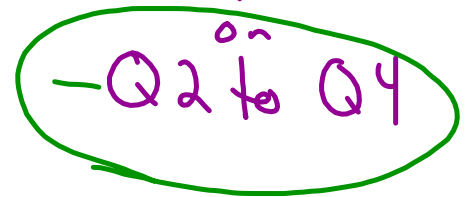
Q2 to Q1



$$f(x) = -x^{3421}$$

odd
+ Q3 to Q1

- Q2 to Q4



Homework

pg. 12 # 3, 7, 10, 11, 12, 14