

## Assessment Quiz!

- get out a blank sheet of paper
- complete as many as possible in 15 minutes
- hand in

p.122 # 1cd, 2, 3bcd

Sep 17-10:23 AM

## Unit 2 - Polynomials

Polynomial Functions

Sept 17./2014

Consider the familiar functions:

linear:  $y = ax + b$

quadratic:  $y = ax^2 + bx + c$

order/degree

1

2

We can continue this pattern:

cubic:  $y = ax^3 + bx^2 + cx + d$

3

quartic:  $y = ax^4 + bx^3 + cx^2 + dx + e$

4

quintic:  $y = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$

5

In general, a polynomial function in standard form is:

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

where  $\{a_0, a_1, \dots, a_n \in \mathbb{R}\}$  and  $\{n \in \mathbb{N}\}$ includes  
zero.↑  
natural numbers  
{1, 2, 3, ...}

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$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

notes:

- (1)  $a_n$  is the leading coefficient
- (2) the degree of a polynomial is the value of the highest exponent
- (3) a polynomial in standard form has descending powers of  $x$

Recall:

first differences are constant for a linear relation  
 second differences are constant for a quadratic relation.

Higher-order finite differences can be used to identify other polynomials from data points.

For an order- $N$  polynomial, the  $N$ th difference will be constant.

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### Finite Differences

$$y = ax + b$$

$x$	$y$	$\Delta y = y_2 - y_1$	$x$	$y$	$\Delta y$	$\Delta^2 y$
0	$b$		0	$c$		
1	$a+b$	$a$	1	$a+b+c$	$a+b$	$2a$
2	$2a+b$	$a$	2	$4a+2b+c$	$3a+b$	$2a$
3	$3a+b$	$a$	3	$9a+3b+c$	$5a+b$	$2a$
4	$4a+b$	$a$	4	$16a+4b+c$	$7a+b$	$2a$
5	$5a+b$	$a$	5			

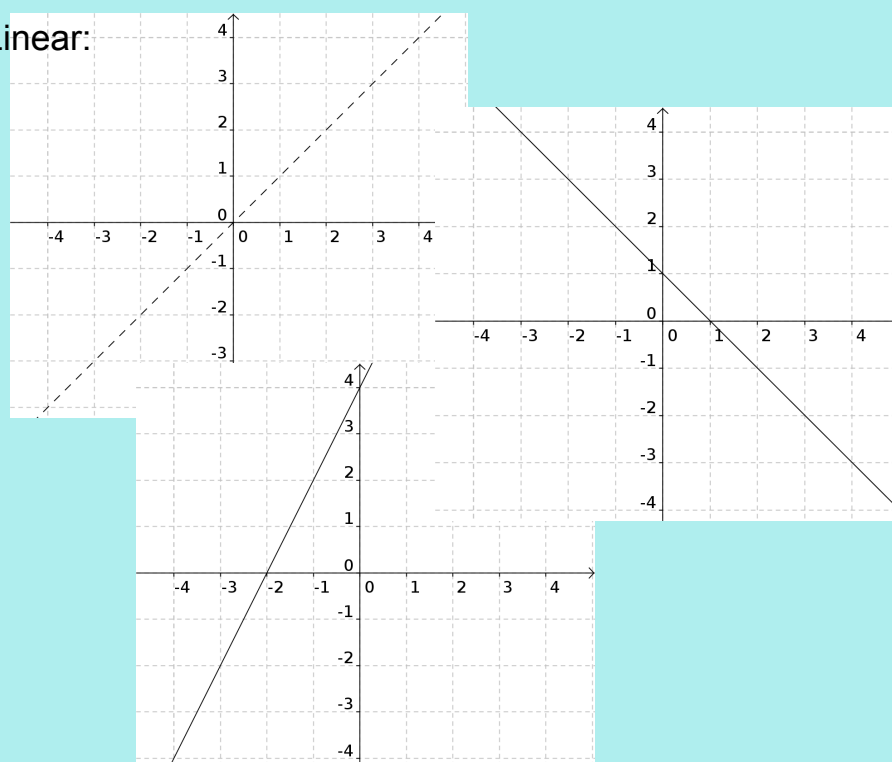
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Domain is always  $\{x \in \mathbb{R}\}$

Range varies according to graph.

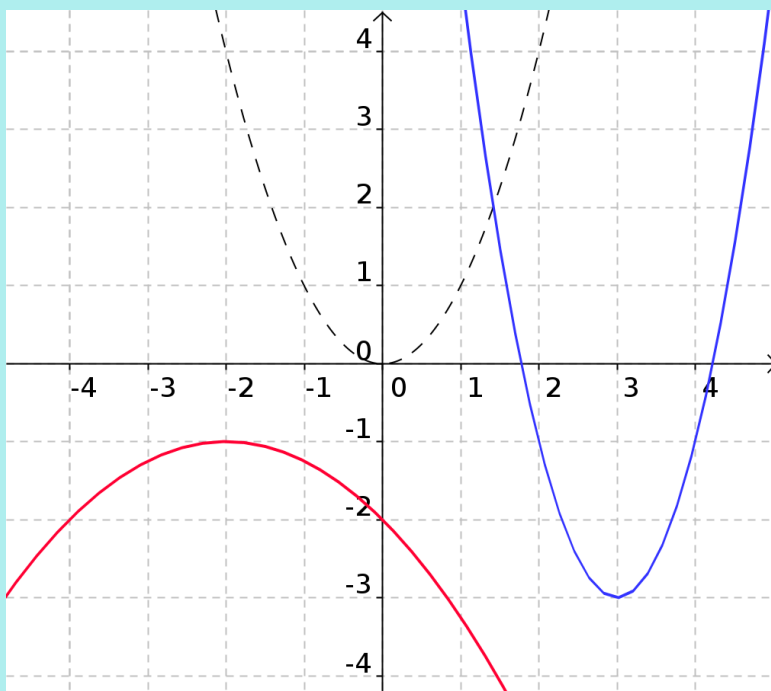
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Linear:



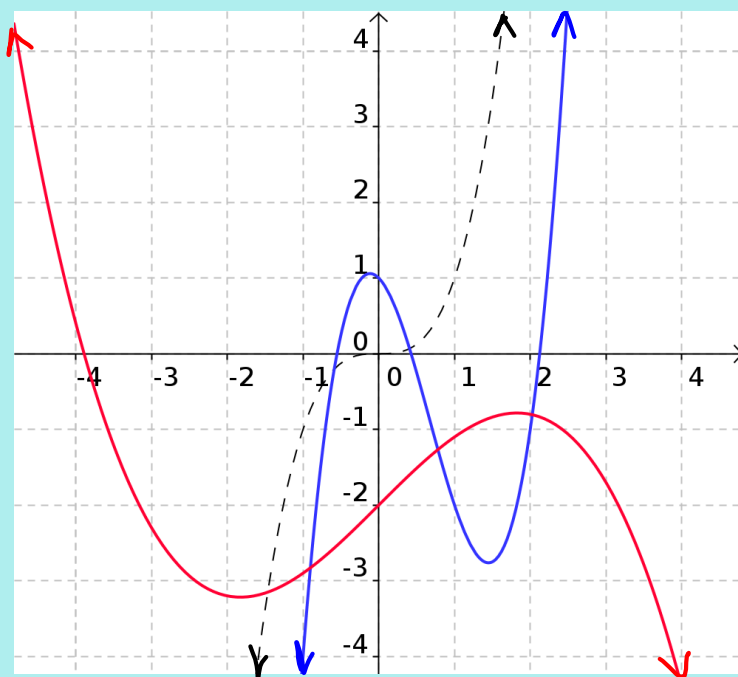
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Quadratic:



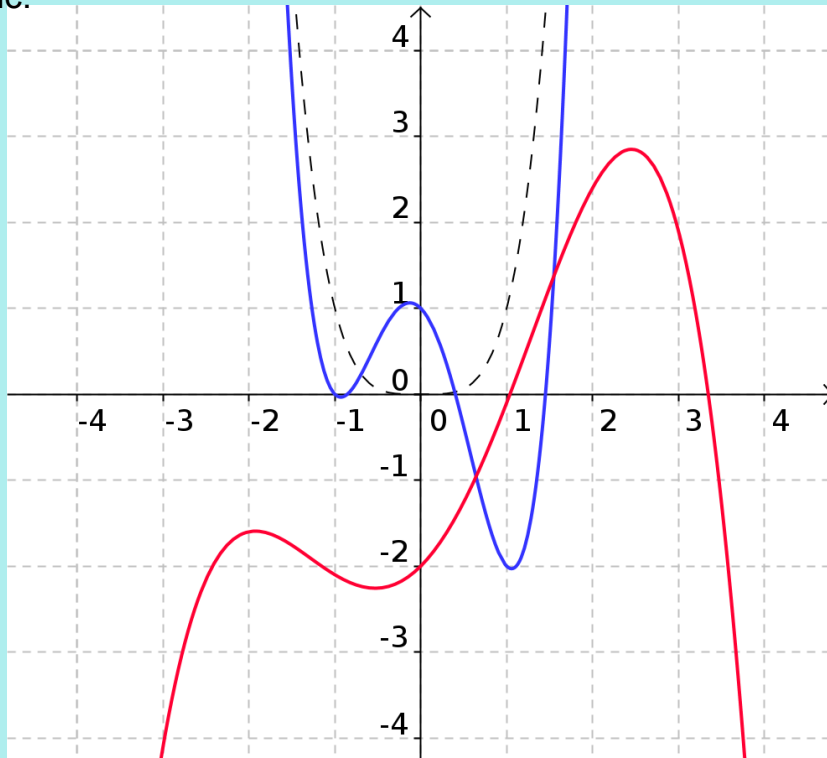
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Cubic:



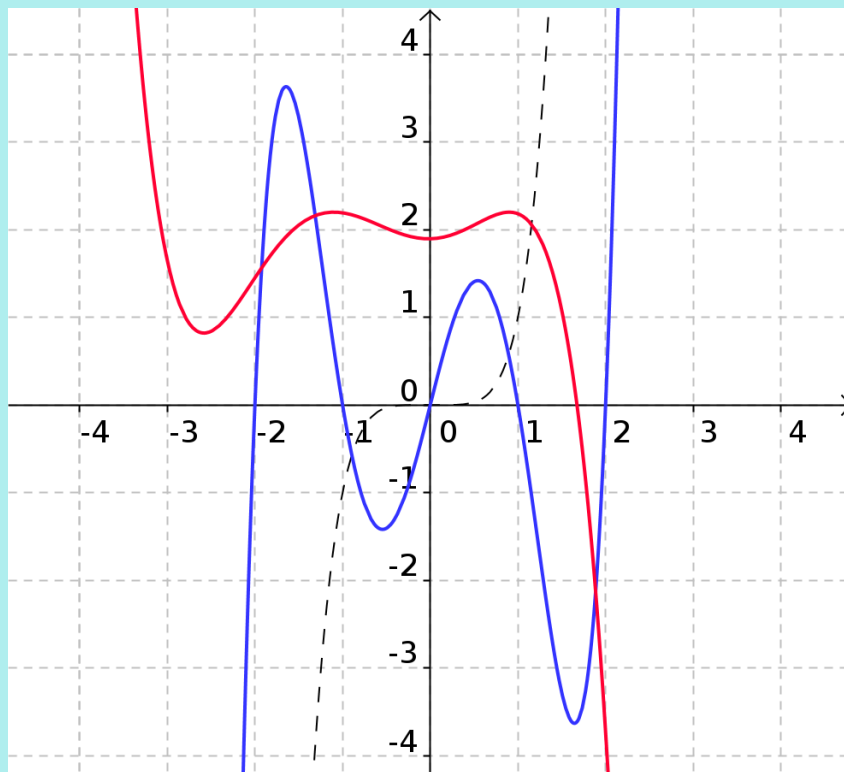
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Quartic:



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Quintic:



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Assigned Work:

p.127 # 1 - 5

3.

4b.

5.

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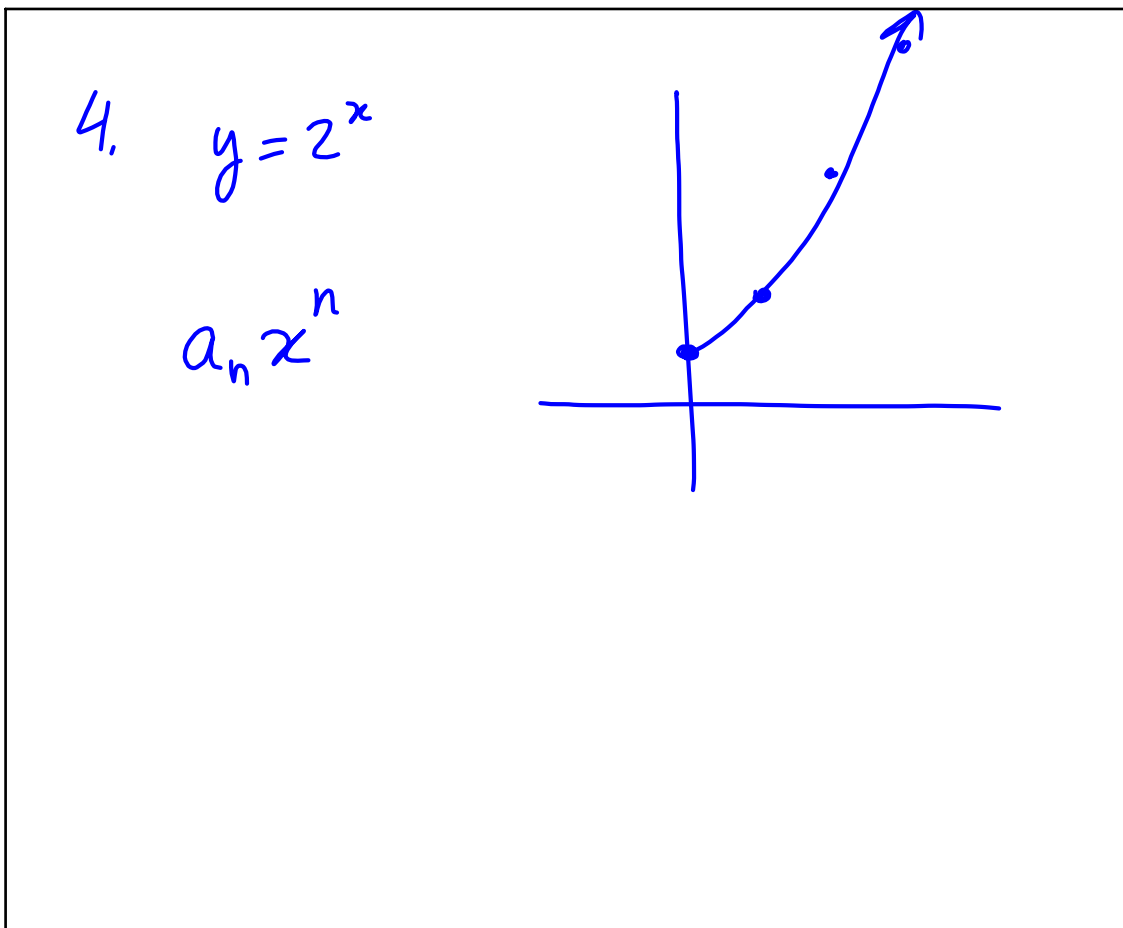
3. (a)

1st difference

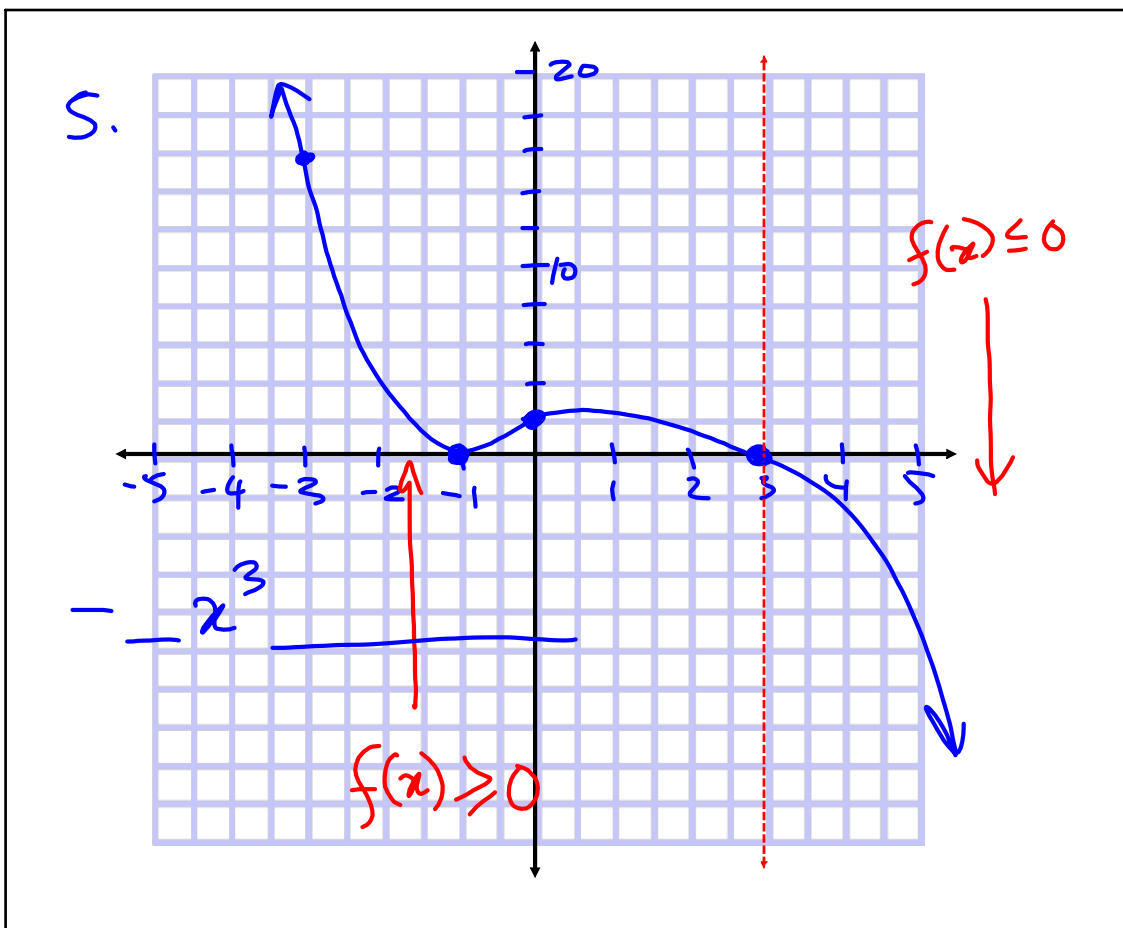
Sales	Earn	$\Delta y$
0	200	
500	225	$225 - 200 = 25$
1000	250	$25$
1500	275	$25$
2000	300	$25$

$\therefore$  linear function

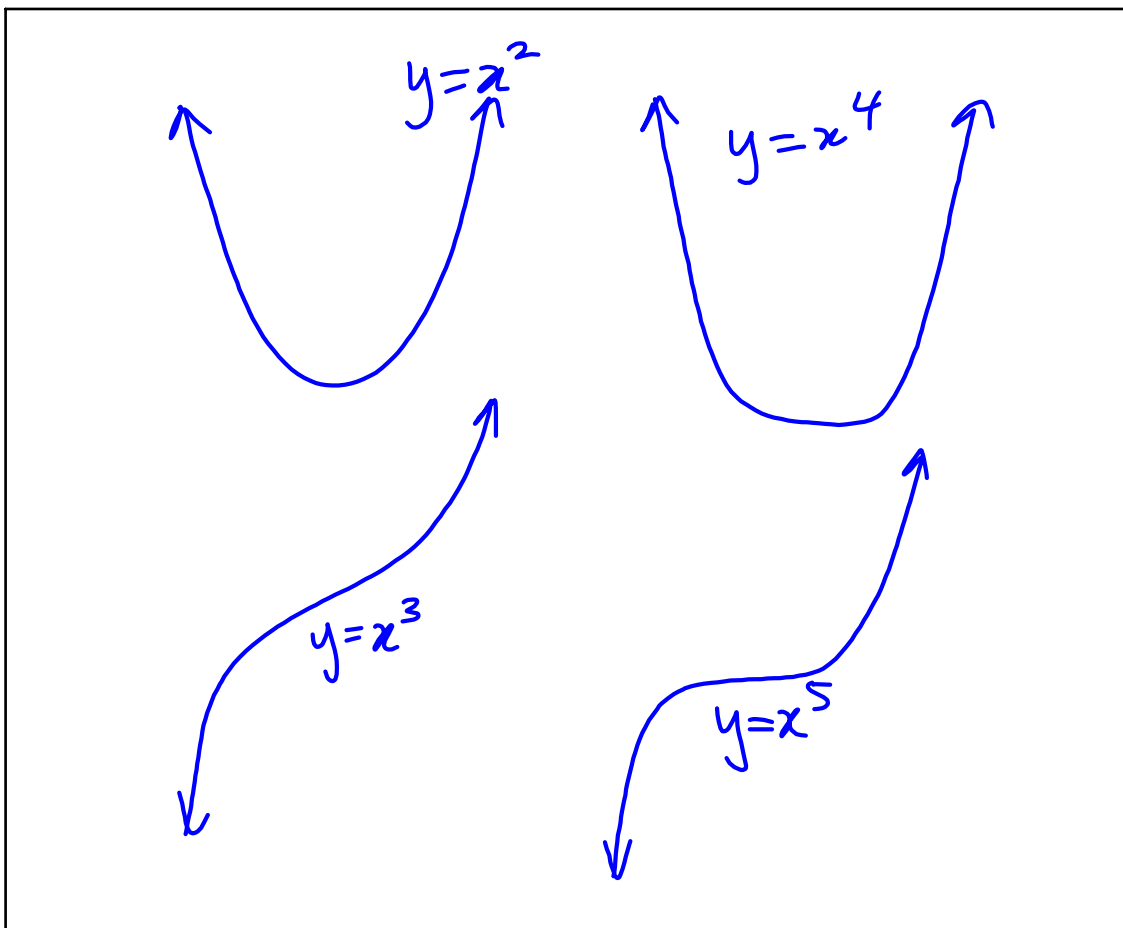
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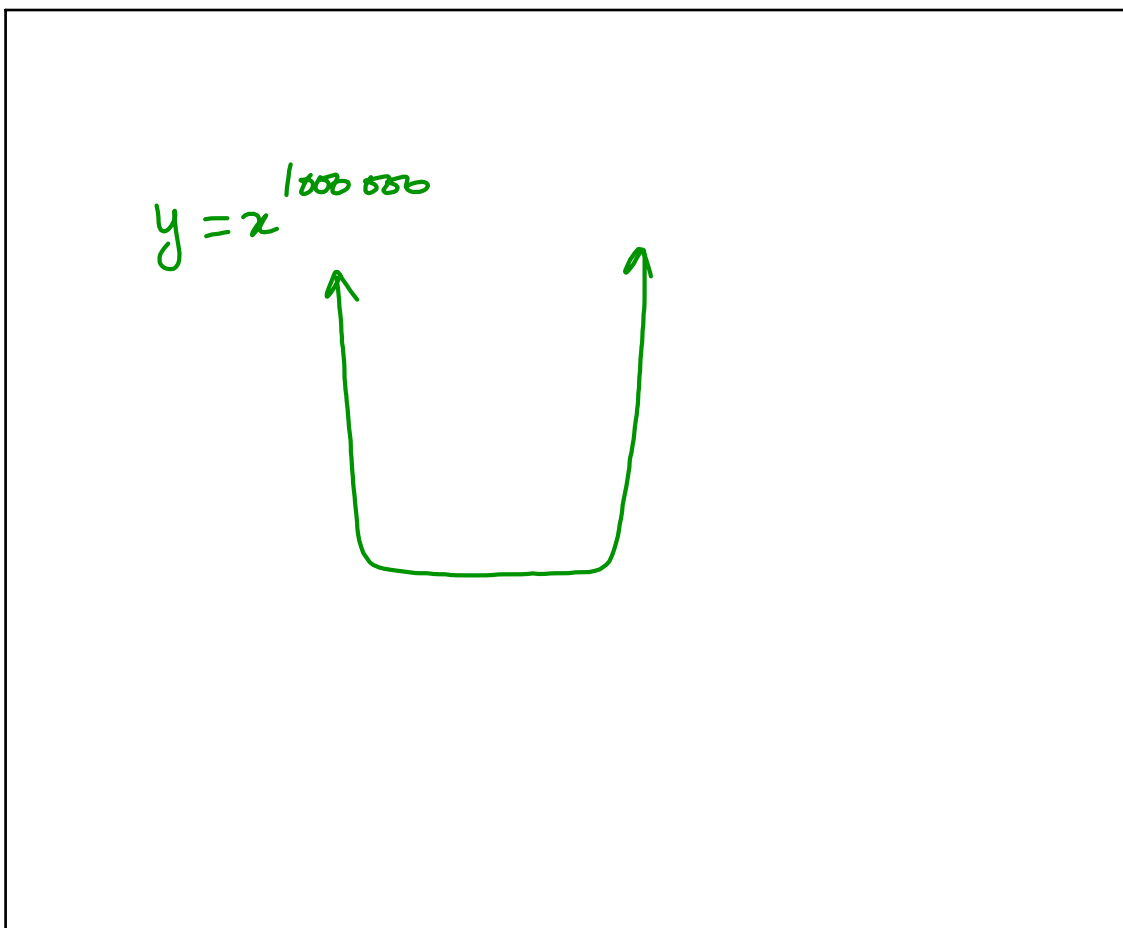
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