PC 12 Session 6

January 26, 2022 11:43 AM

Pre-Calculus 12 Session 6
Thursday, January 27, 2022

1. Last Day's Practice: none.

<u>The Unit 1 Hand-in Assignment was due in last day.</u>

3. More about Section 3.1: Characteristics of Polynomial Functions and their Graphs

4. Section 3.2: The Remainder Theorem

5. Section 3.3: The Factor Theorem and Fun with Factoring!

6. Section 3.4: Equations and Graphs of Polynomial Functions (should we get this far)

7. <u>The Chapter 1 Test</u>

Homework: This depends on how far we get today.

Readings: Section 4.2 (pages 180 to 186), Section 4.3 (pages 191 to 201), Section 4.4 (pages 206 to 211).

Practice from Textbook to try:

Section 3.1: page 114, Practise 1, 2, 6, 7, 9.
Section 3.2: pages 124-125, Practise 1, 2, 3a, 4c, 5b, 6a, c, e, 7a, c, 8a,c, 10, 12.
Section 3.3: pages 133-135, Practise 1, 2a, c, e, 3a, c, e, 4a, c, e, 5a, c, e, 6a, e, 7b, d, 9, 11, 14.
Section 3.4: pages 147-150, 1, 2a, c, e, 4a, c, 5, 7, 8a, c, 9a, c, e, 10a, c, 11, 14, 16.

Hand-in Assignments: Continue working on the <u>Chapter 3 Hand-in Assignment</u>. NOTE: It will likely be due in on Thursday, February 3.

The <u>Chapter 3 Test</u> will likely be on Tuesday, February 8. This will depend on how far we get today and next day.

Some things I noticed

* it's important to factor out the "b"

$y = f(x)$ $y = a f(b(x-h)) + k$

$y = 3f(-2x+6) - 5$ reflection

$y = 3f(\frac{-2}{-2}x + \frac{6}{-2}) - 5$ — reflection across the y-axis

$y = 3f(-2(x-3)) - 5$ —

VE by factor 3   3 Right

$|a|$ is the vertical stretch factor

$|a|>1$ VE $0<a<1$ VC.

$|\frac{1}{b}|$ is the Horizontal stretch factor.

$\frac{1}{b} = \frac{1}{2}$ $\therefore$ HC by factor $\frac{1}{2}$

$|\frac{1}{b}|>1$ HE $0<|\frac{1}{b}|<1$ HC.

$y = 2f(\frac{3}{4}(x-2)) + 7$

b $\frac{1}{b} = \frac{1}{3/4} = \frac{4}{3} > 1$ HE by factor $\frac{4}{3}$

Last time: Characteristics of graphs of polynomials of various degrees.

End behaviour - determine by the degree (odd or even?) and the sign of the leading coefficient (+ or −)

y-intercept: always equal to the constant term, c.

$\therefore$ The y-int coordinates are (0, c)

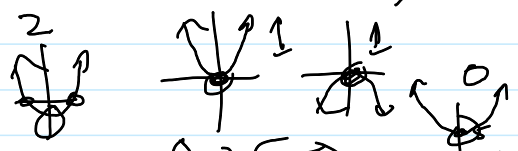
All graphs of polynomial functions have 1 y-axis intercept.

# of x-intercepts

Degree

odd 1 (linear): have exactly 1 x-axis intercept.
no turning pts.

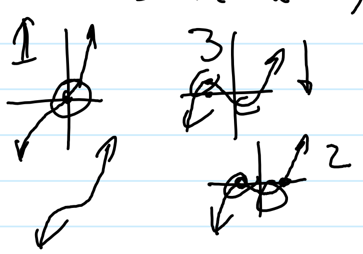
2 (quadratic): can have 0, 1 or 2 x-axis intercepts



1 turning point

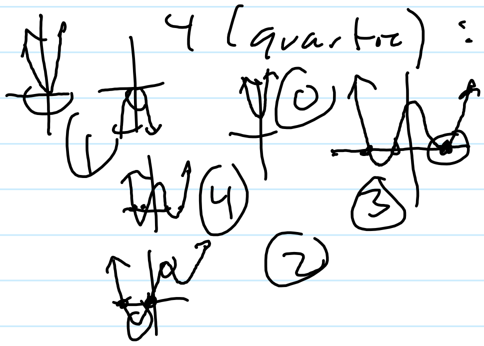
$y = 0x^2 + 5$

odd 3 (cubic): 1, 2 or 3 x-axis intercepts



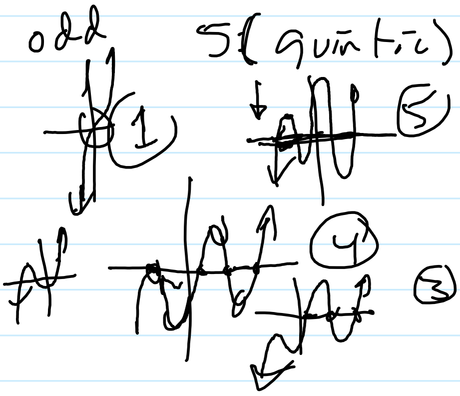
1 or 2 turning points

4 (quartic): 0, 1, 2, 3, or 4 x-axis intercepts.



1 or 3 turning points.

odd 5 (quintic): 1, 2, 3, 4, or 5 x-axis intercepts



0, 2, or 4 turning points.

ZEROES

x-axis intercepts are also called ZEROS of a function (because f(x) = 0 at the x-intercept)
(y = 0)

degree = "n"

- for odd degree polynomials the number of x-axis intercepts can a minimum of 1 and a maximum of n. degree.
- For even degree polynomials, the minimum # of x-ints is zero and the maximum number is

equal to n.

Domain

The domain of all polynomials is $\{x \mid x \in \mathbb{R}\}$

Range: depends on degree and the sign of the leading coefficient, a

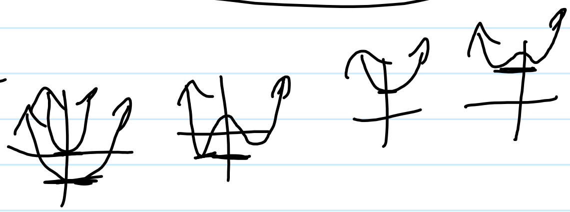
Odd degree, a is + or a is −

The range is $\{y \mid y \in \mathbb{R}\}$.

Even degree polynomials will have either a maximum or a minimum y-value.

Even degree, a is +

- graph "opens up".



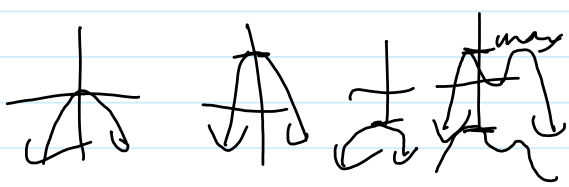
- there is a minimum value of y.

The Range will always have the form:

$$\{y \mid y \geq \text{minimum}, y \in \mathbb{R}\}.$$

Even degree, a is −

- graph opens down



- there's a maximum value of y

The range will have the form:

$$\{y \mid y \leq \text{maximum}, y \in \mathbb{R}\}.$$

possible number of turning points

odd $n=1$ (linear) 0

odd $n=1$ (linear) 0

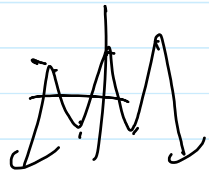
even $n=2$ (quadratic) 1

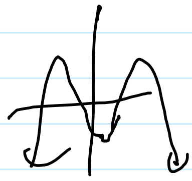
odd $n=3$ (cubic) 2 or 0

even $n=4$ (quartic) 3 or 1

odd $n=5$ (quintic) 4, 2 or 0

even $n=6$ (hexic) 5, 3, 1





The graph of a polynomial of degree n can have $(n-1)$ turning points or some even number less than $(n-1)$.

2, 4, 6, 8

$n = 9$ odd max # of TP's = 8

possible # of TP's = 8, 6, 4, 2 or 0

$n = 14$ even poss # of TP's = 13, 11, 9, 7, 5, 3 or 1

Do you remember long division?