PC 12 Session 9

February 7, 2022 1:45 PM

Pre-Calculus 12 Session 9
Tuesday, February 8, 2022

1. Last Day's Homework:
   - Practice: Section 3.2: pages 124-125, Practise 1, 2, 3a, 4c, 5b, 6a, c, e, 7a, c, 8a,c, 10, 12.
   - Readings: Nothing new.
   - Hand-in Assignments and other things: The Chapter 3 Hand-in Assignment will be due on THURSDAY, FEBRUARY 10. The Chapter 3 Test will be on Tuesday, February 15.

2. A Little more about Section 3.4: Solving Equations of, and Sketching Graphs of, Polynomial Functions, Including Sketching Graphs of Polynomials using Transformations

3. Section 4.1: Angles and Angle Measures

4. Section 4.2: The Unit Circle

5. Section 4.3: Trigonometric Ratios

Homework: This depends on how far we get today.

Readings: Nothing new.

Practice from Textbook to try:

Section 3.4: pages 147-150, Practise 1, 2a, c, e, 4a, c, 5, 7, 8a, c, 9a, c, e, 10a, c, 11, 14, 16.
Section 4.1: pages 175-176, Practise 1, 2a), c), e), 4a), c), e), 6a), c), e), 7a), c), e), 8a), c), 9a), b), 12a), c), 13.
Section 4.2: pages 186-188, Practise 2a), c), e), 2a), c), e), 3a), c), 4a), c), e), h), i), 5a), c), e), 6, 7, 9, 13, 18.
Section 4.3: pages 201-203, 1a), c), e), g), i), k), 2a), c), e), g), i), k), 3a), c), e), 6a), c), e), 9a), c), e), 10 (all parts), 11 (all parts), 12a), c).

Hand-in Assignments: Continue working on the Chapter 3 Hand-in Assignment. NOTE: It will be due in next class. Additionally, you should begin working on the Chapter 4 Hand-in Assignment. That assignment will likely be due in on Thursday, February 17.

The Chapter 3 Test will be on Tuesday, February 15.

To be properly prepared for the Chapter 1 Retest, the Chapter 3 Test, and all future tests, you need to be attempting all the suggested textbook Practise. Additionally, you should attempt the Chapter Practice Tests from the textbook (e.g. the Chapter 1 Practice Test on pages 58 and 59 of the textbook).

Ch 3 Practice test pp 155-156
" " Review pp 153-154

Section 3.3: Factoring

When all other factoring methods fail, you need to use the integral zeros theorem to determine the possible integral zeros of the corresponding function of the polynomial.

eg $x^3+2x^2-13x+10$

possible integral zeros of the corresponding function are the factors of $+10$

i.e. $\pm1, \pm2, \pm5, \pm10$

- Rather than check the 8 possibilities, use your calculator to find one of the zeros. Then divide to get the depressed polynomial and factor that using appropriate methods.

So, input $Y_1 = x^3+2x^2-13x+10$ into a graphing calculator. Then go to the TABLE $\boxed{\text{Graph}}$

X	Y1	
-6	-56	
a -5	0	
-4	30	
-3	40	
-2	36	
-1	24	
0	10	

X= -5

Since -1 is a zero of $P(x)=x^3+2x^2-13x+10$, $(x+5)$ is a factor of

$$
\begin{array}{r|l}
 & x^2-3x+2 \\
x+5 & x^3+2x^2-13x+10 \\
 & -(x^3+5x^2) \\
 & -3x^2-13x \\
 & -(-3x^2-15x) \\
 & 2x+10 \\
 & -(2x+10) \\
 & 0
\end{array}
$$

factor me!!

$(x-1)(x-2)$

1 and 2 are also zeros of $P(x)=x^3+2x^2-13x+10$

$\therefore\ x^3-2x^2-13x+10=(x+5)(x-1)(x-2)$

It's important to be able to factor higher degree polynomials so that we can

1) ~~sketch~~ graphs of polynomial functions without a graphing calculator.

→ important features are :

- end behaviour
- zeros (x-axis intercepts)
- y-axis intercept (constant term).

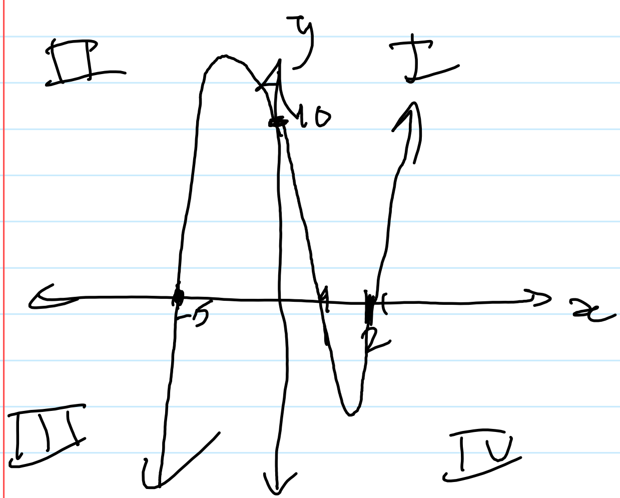
$P(x) = x^3 + 2x^2 - 13x + 10 = (x+5)(x-1)(x-2)$

zeros are at $x = -5, 1, 2$

y-axis intercept : $y = 10$ $(0, 10)$

End Behaviour: Start down in Q $\boxed{III}$

ends up in Q I



Multiplicity of zeros.

If the multiplicity of a zero is 1, the graph-line passes through that zero (x-intercept).

If the multiplicity of a zero is 2, 4, 6 ..., or any other even number, the graph-line has a point of tangency at that point.

$P(x) = (x-3)^2(x-5) = (x-3)(x-3)(x-5)$

zeros: $x = 3$ (multiplicity of 2)

$x = 5$ (multiplicity of 1)

$-3 \times -3 \times -5$

-45

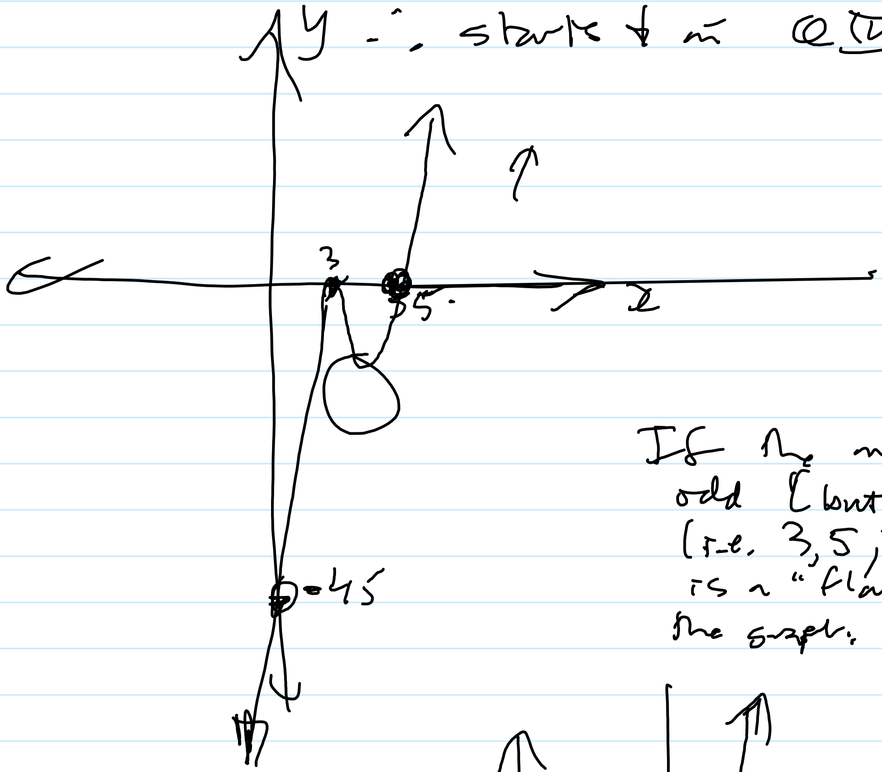
There's a point of tangency at $x = 3$

Constant term $= (-3)(-3)(-5) = -45 =$ y-axis

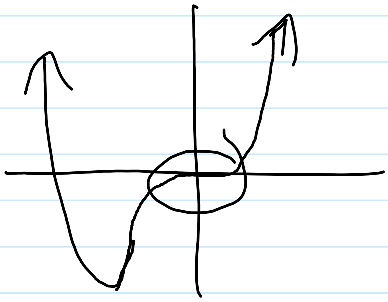
- it's a cubic with a positive leading coefficient.

y-intercept.

∴ starts ↓ in Q III, ends ↑ in Q I



If the multiplicity is odd (but not 1), (i.e. 3, 5, 7, 9 ...), there is a "flat spot" in the graph.



The other reason why we want to factor polynomials is so that we can solve higher degree polynomial equations.

$$P(x) = x^3 + 2x^2 - 13x + 10 = (x-1)(x+5)(x-2)$$

- This function has zeros at $x = 1, -5$ and 2

The corresponding equation is

$$x^3 + 2x^2 - 13x + 10 = 0$$

The roots of this equation can be easily determined if the equation is written in factored form.

$$(x-1)(x+5)(x-2) = 0$$

If any factor equals zero, the product of the factors equals zero

$(x-1)(x+5)(x-2)=0$ — If any factor equals zero, the product of the factors equals zero.

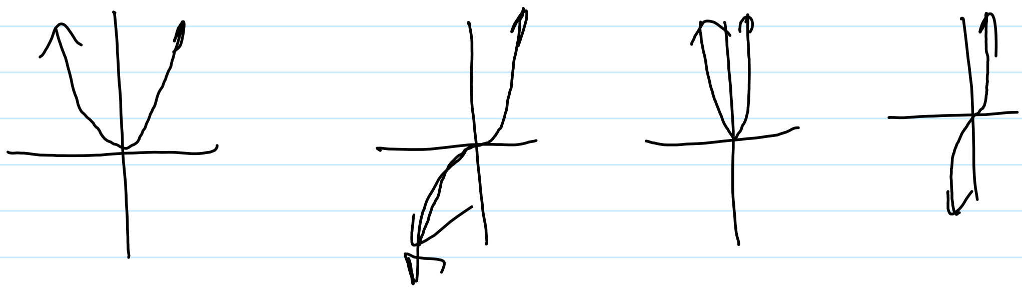
$x-1=0 \qquad x+5=0 \qquad x-2=0$

$x=1 \qquad x=-5 \qquad x=2$

The roots of an equation are equal to the zeros of the corresponding function.

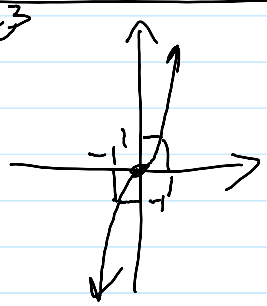
We can graph polynomial functions using transformations of the "basic" polynomials

$y=x^2 \qquad y=x^3 \qquad y=x^4 \qquad y=x^5$



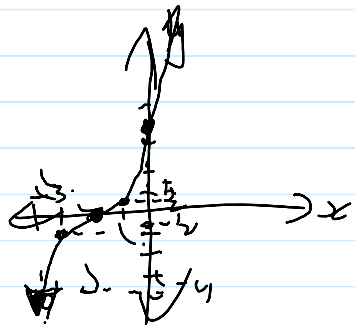
Sketch $y=\frac{1}{2}(x+2)^3 \Leftarrow$ VC by $\frac{1}{2}$, 2 units left.

$y=x^3$



x	y
0	0
1	1
-1	-1
2	8
-2	-8

x	y
-2	0
-1	1/2
-3	-1/2
0	4
-4	-4



Chapters 4, 5 and 6: Trigonometry $\geq \frac{1}{3}$ of course!

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Of course!

Chapter 4: Trigonometry and the Unit Circle

A Bit of Review.

You should have studied right triangle trigonometry