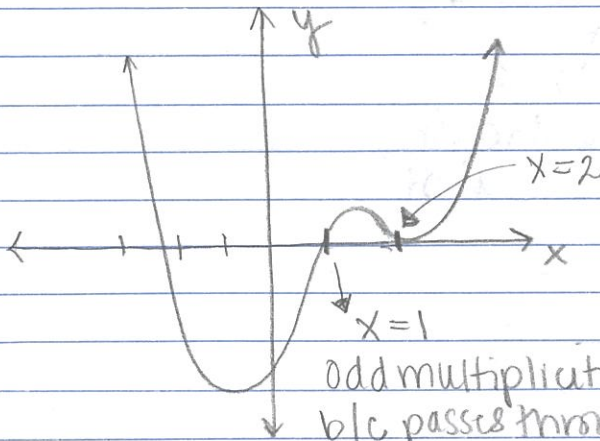


(Day 1)

Section 6.6 - Fundamental Thm of Algebra

Finding all zeros using the calc to help...

ex: $y = 2x^4 - 5x^3 - 9x^2 + 32x - 20$
↳ use the calc to steal a zero.



odd multiplicity
b/c passes through
the x-axis
* can only assume
mult. of 1

even multiplicity
b/c touches the x-axis
* can only assume
mult. of 2

* always choose
to use zero w/
even mult. b/c
you can use it 2
times w/ synthetic

$$\begin{array}{r|rrrrrr} (x-2)^2 & 2 & -5 & -9 & 32 & -20 \\ & \downarrow & 4 & -2 & -22 & 20 \\ \hline & 2 & -1 & -11 & 10 & 0 \end{array}$$

$$\begin{array}{r|rrrr} 2 & 2 & -1 & -11 & 10 \\ & \downarrow & 4 & 6 & -10 \\ \hline & 2 & 3 & -5 & 0 \end{array}$$

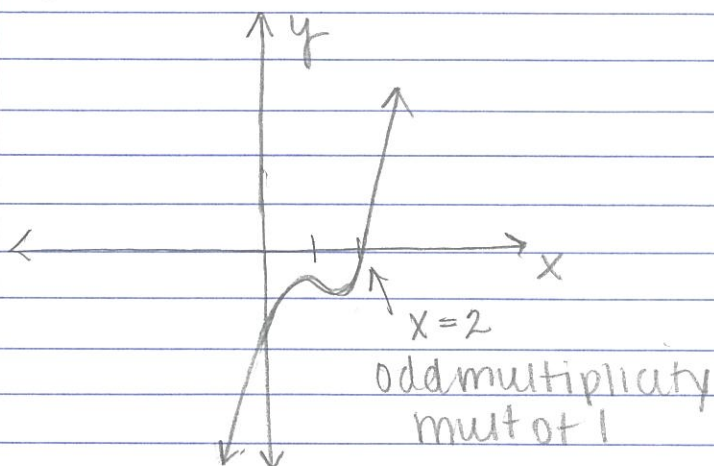
$$0 = (x-2)^2(2x^2 + 3x - 5)$$

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

$x=2$ $x=-5/2$ $x=1$
 (mult. of 2)

4 roots!

ex: $y = 3x^3 - 10x^2 + 10x - 4$



$$\begin{array}{r|rrrr} 2 & 3 & -10 & 10 & -4 \\ & \downarrow & 6 & -8 & 4 \\ \hline & 3 & -4 & 2 & 0 \end{array}$$

$$0 = (x-2)(3x^2 - 4x + 2)$$

$$x = 2 \quad x = \frac{4 \pm \sqrt{16 - 4(3)(2)}}{2(3)}$$

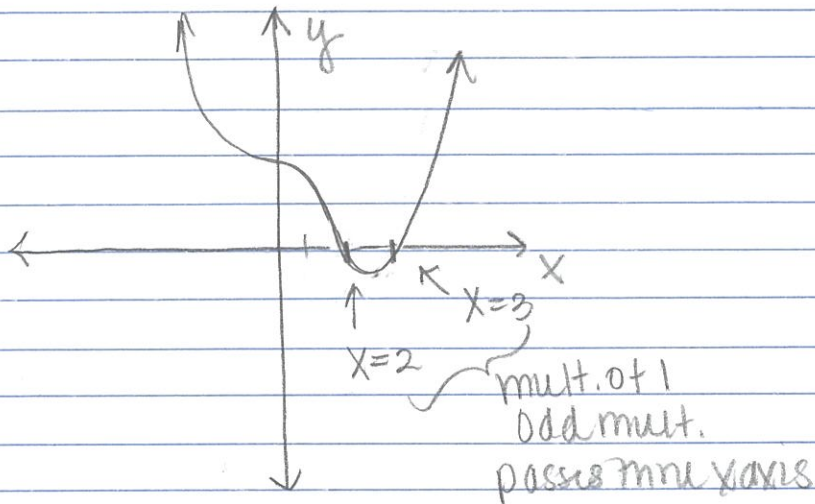
$$x = \frac{4 \pm \sqrt{16 - 24}}{6}$$

$$x = \frac{4 \pm \sqrt{-8}}{6}$$

$$x = \frac{4 \pm 2i\sqrt{2}}{6}$$

$$x = \frac{2 \pm i\sqrt{2}}{3}$$

ex: $y = x^4 - 5x^3 + 7x^2 - 5x + 6$



$$\begin{array}{r|rrrrrr} 2 & 1 & -5 & 7 & -5 & 6 \\ & \downarrow & 2 & -6 & 2 & -6 \\ \hline & \uparrow & -3 & 1 & -3 & 0 \end{array}$$

$$0 = (x-2)(x^3 - 3x^2 + x - 3)$$

$$x^2(x-3) + 1(x-3)$$

$$(x^2+1)(x-3)$$

$$0 = (x-2)(x^2+1)(x-3)$$

\downarrow $x=2$ \downarrow $x^2 = -1$ \downarrow $x=3$
 $x = \pm \sqrt{-1}$
 $x = \pm i$



A series of horizontal blue lines for writing, with a vertical red margin line on the left side.

