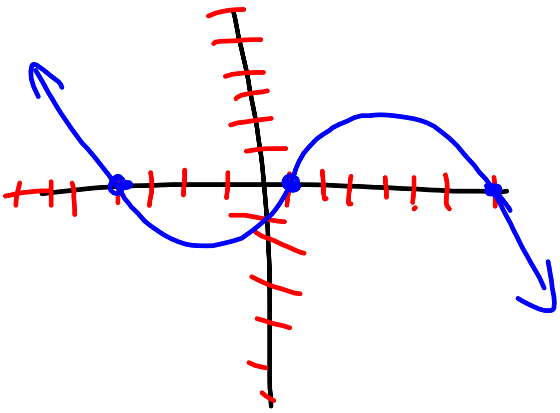
Bellwork: Sketch the graph of the function without using technology

$f(x)= -(x-1)(x+4)(x-7)$; $f(x)= -x^3+4x^2+25x-28$

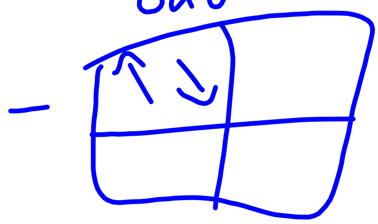
1 -4 7



degree: 3 odd

↖ ↘ −

odd

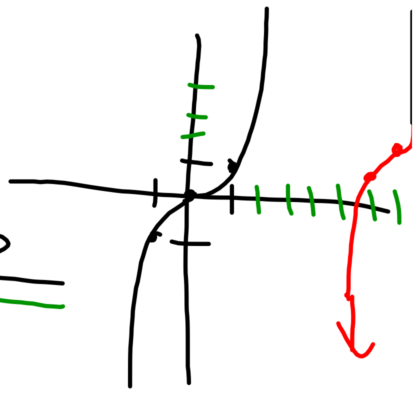


Homework 2.2 Solutions:

1. 3b $f(x) = x^3$

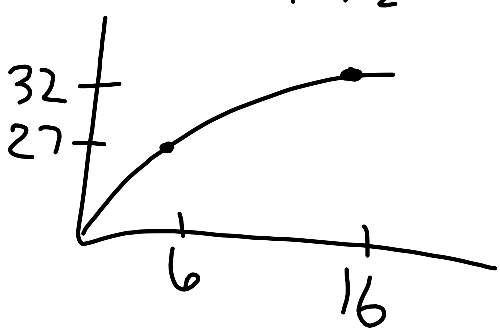
$h(x) = f(x-7)+2$

right 7 up 2



7) $[6, 16]$ x_1 x_2

$\frac{y_2-y_1}{x_2-x_1} = \frac{32-27}{16-6}$



$\frac{1}{2} = \frac{5}{10}$

Homework 2.3 Solutions

1. $f(x)=2x^5+7x^3-4x$
$x \to -\infty, y \to -\infty$
$x \to \infty, y \to \infty$ 5

2. $f(x)=-3x^6-8x^5+2x$
$x \to -\infty, y \to -\infty$
$x \to \infty, y \to -\infty$ 6

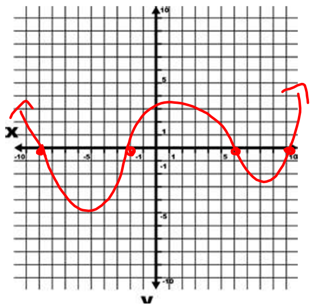
3. $f(x)=4x^7+5$
$x \to -\infty, y \to -\infty$
$x \to \infty, y \to \infty$ 7

4. $f(x)=-10x^3-3x^2-5$
$x \to -\infty, y \to \infty$
$x \to \infty, y \to -\infty$ 3

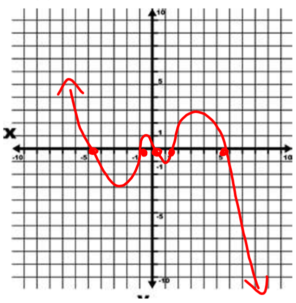
5. $f(x)=-6x^{10}+5x^4-5x^3+9$
$x \to -\infty, y \to -\infty$
$x \to \infty, y \to -\infty$ 10

6. $f(x)=8x^4+10x^3+3x-4$
$x \to -\infty, y \to \infty$
$x \to \infty, y \to \infty$ 4

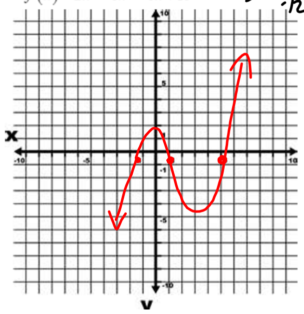
7. $f(x)=(x+9)(x-10)(x-6)(x+2)$
$f(x)=x^4-5x^3-98x^2+372x+1080$



8. $f(x)=(-3x)(x^2-1)(x^2-25)$
$f(x)=-3x^5+78x^3-75x$



9. $f(x)=(2x+3)(x-1)(x-5)$
$f(x)=2x^3-8x^2-8x+15$

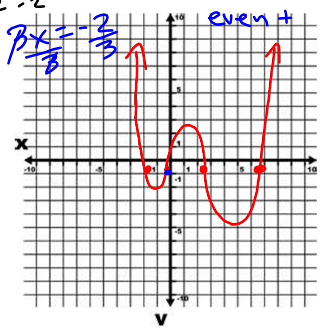


10. $f(x)=(3x+2)(x-6)(x^2-4)$
$f(x)=3x^4-16x^3-24x^2+64x+48$

$3x+2=0$
$-2 \quad -2$
$\frac{3x}{3}=\frac{-2}{3}$

$x = 6, 2, -2, -\frac{2}{3}$

even +



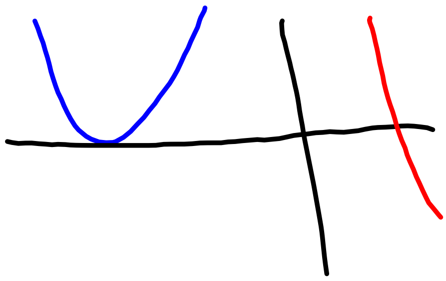
Today's Objectives:

I can graph polynomials with or without technology

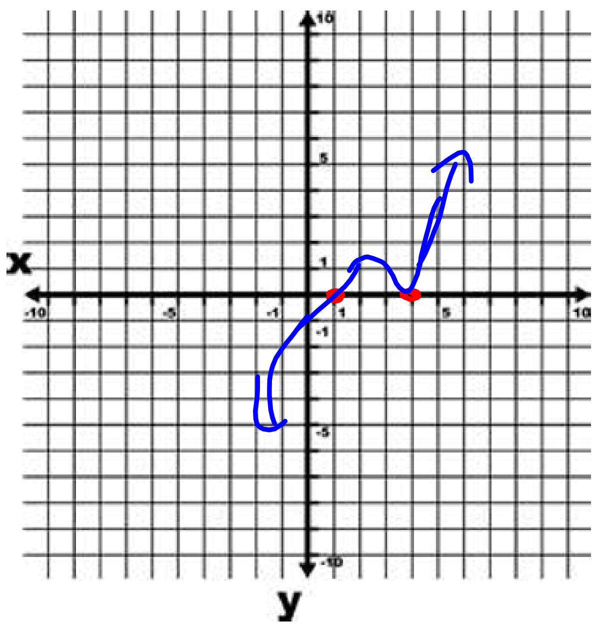
Multiplicity of Zeros: The Fundamental Theorem of Algebra states that zeros can be repeated. When this is the case the same factor occurs multiple times, we say that the factor has a multiplicity of the number of time it is repeated.

$(x-5)^4$ has a zero at (5,0) and is repeated 4 times so it has a multiplicity of 4.

If a repeated zero has a multiplicity that is **even** its graph will **touch** that point and return the other direction. If it is **odd** then the graph will **pass** all the way through that point.



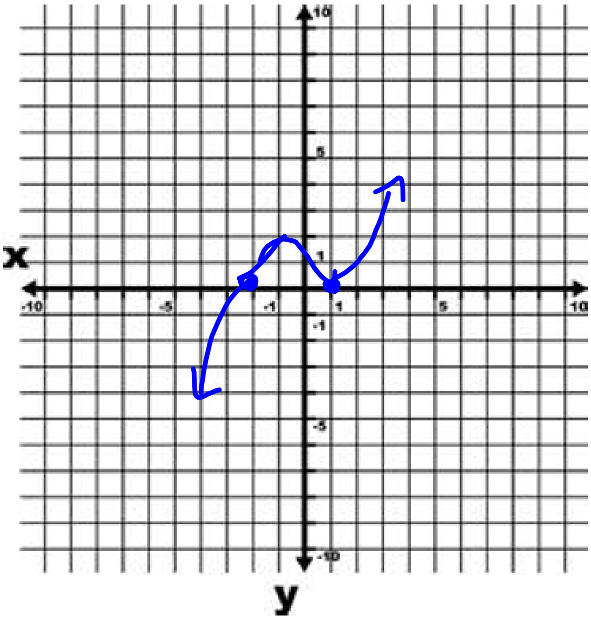
a. $f(x) = (X-4)^2(X-1)^3$



Zeros	mult	T/C
4	2 EVEN →	T
1	3 ODD →	C

E.B. deg: 5 odd +

b. $f(x) = (x-1)^2(x+2)$



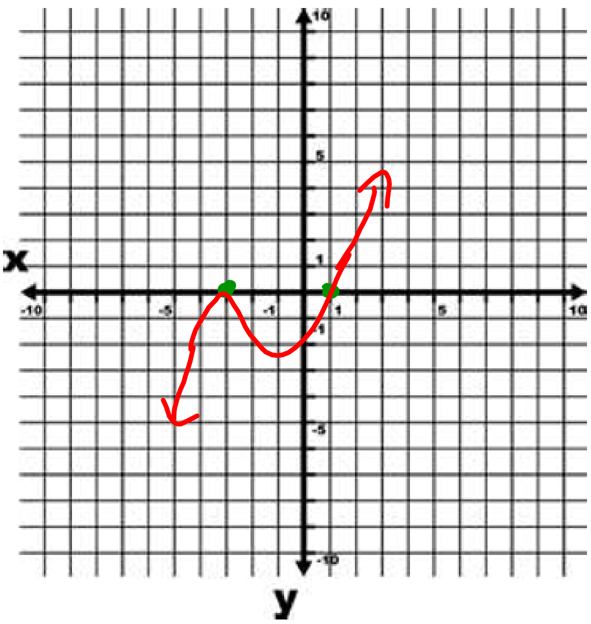
zero	mult	T/C
1	2 $\xrightarrow{\text{even}}$	T
−2	1 $\xrightarrow{\text{odd}}$	C

E.B. deg: 3 odd +

↙ ↗

2 + 1 = 3

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

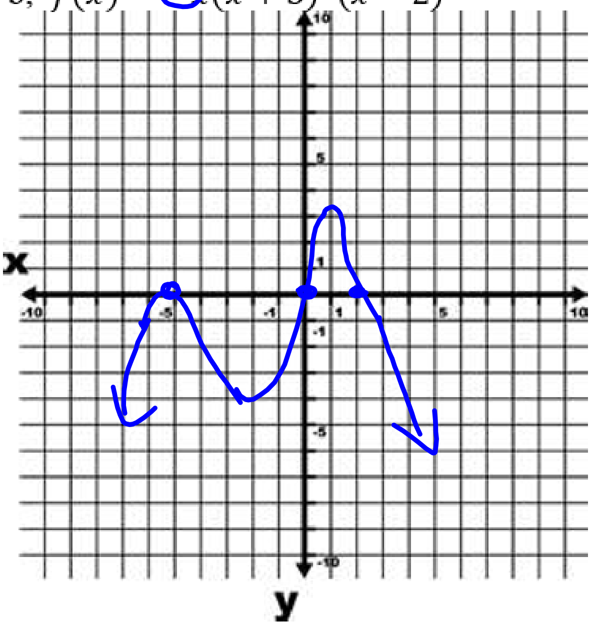


zero	mult	T/C
−3	2	T
1	1	C

3 odd +

↙ ↗

b, $f(x) = -x(x+5)^4(x-2)^3$



zero	mult	T/C
−5	4 →	T
2	3 →	C
0	1 →	C

E.B. deg: 8 even

Mini Lesson 11: Application of Quadratics

Geraldo goes every year to a cliff diving competition in Acapulco. The competitors dive off of cliffs of varying heights into the ocean. His height as a function of time can be modelled by the following equation:

$h(t) = -16(t-1)^2 + 156$, where t is time in seconds and h is his height in feet.

How long does it take for Geraldo to reach his maximum height?

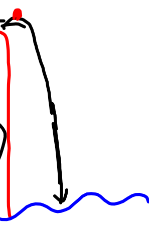
(1, 156) 1 sec

What is Geraldo's maximum height above the ocean?

156ft

How high is the cliff Geraldo is jumping off of?

$h(0) = -16(0-1)^2 + 156 = \boxed{140\text{ft}}$



How many seconds until he hits water?

$0 = -16(t-1)^2 + 156$

$-156 \qquad -156$

$\frac{-156}{-16} = \frac{-16(t-1)^2}{-16}$

$\sqrt{9.75} = \sqrt{(t-1)^2}$

$3.12 = t - 1$

$+1 \qquad +1$

$\boxed{t = 4.12\text{sec}}$