Day 4 - The Factor Theorem

Do Investigation Pg.255 #1 using miniwhiteboards
Then 2-3

Factor Theorem:
If a binomial has a remainder of zero when divided into a polynomial, then it is a factor of that polynomial.

1) Determine which binomials are factors of

$$x^3 - 6x^2 + 11x - 6$$

✓ $(x-1)$ 0

✓ $(x-2)$ 0

✓ $(x-3)$ 0

$(x+2)$ -60

X	Y1
-2	-60
-1	-24
0	-6
1	0
2	0
3	0
4	6

X= -2

i) 0 $\underline{(x-2)}$ ii) 30

iii) -12 iv) 0 $\underline{(x+5)}$

$x^2+3x-10$

Factoring Polynomials:

If we are asked to factor $x^3 + 5x^2 + 2x - 8$ we need to

Steps:

1. Determine one x -intercept of the polynomial and use the x-intercept to write a binomial factor.
2. Use Synthetic division to divide out the polynomial
3. Use traditional methods of factoring to finish factoring the polynomial.

Potential Zeros: To determine an x-intercept of a polynomial we need to determine all of the potential x-intercepts. This is done by look in at all of the factors of the constant term of the polynomial.

For 8 the potential zeros are: $\pm 8, \pm 4, \pm 2, \pm 1$

Then we see which of these gives us a remainder of zero.**Hint: use a table of values on your calculator to quickly determine which potential zeros have a remainder of zero.**

2) Factor the following:

$$x^3 + 5x^2 + 2x - 8$$

$x = -4$

$(x+4)$

+4	1	5	2	-8
	↓	4	4	-8
	1	1	-2	0

$(x+4)\underbrace{(x^2+x-2)}$

-1
2

$x-2$

$\frac{-1}{1}$ $\frac{2}{1}$

$(x+4)(x-1)(x+2)$

$$x^3 + x^2 - 14x - 24$$

$x = -3$

$(x+3)$

$$\begin{array}{r|rrrr} & 1 & 1 & -14 & -24 \\ +3 & & & & \\ & \downarrow & 3 & -6 & -24 \\ \hline & 1 & -2 & -8 & 0 \end{array}$$

$(x+3)(1x^2-2x-8)$

$(x+3)(x-4)(x+2)$

$$x^4 + 2x^3 - 4x^2 - 2x + 3$$

Assignment:
Pg. 259 #4, 9, 12-15 odds