Name: ______________________________ Date: __________

PCH: Rational Zeros and Intermediate Value Theorems Ms.Loughran

Do Now:

1. When a function $f(x)$ is divided by $2x-3,$ the quotient is $3x^2-4x+2$ and remainder is $-7.$ Find $f(x)$ in simplest form.

2. Find the remainder when $x^{124}-5x^{76}+2x^{45}-3x+5$ is divided by $x+1.$

Rational Zeros Theorem

If the polynomial $P(x)=a_nx^n+a_{n-1}x^{n-1}+...+a_1x+a_0$ has integer coefficients, then every rational zero of P is of the form

$$\frac{p}{q}$$

where p is a factor of the constant coefficient a_0

and q is a factor of the leading coefficient a_n

Classwork:

1. Let $P(x) = x^4 - 5x^3 - 5x^2 + 23x + 10$. Find the zeros of $P(x)$.

2. Factor the polynomial $P(x) = 2x^3 + x^2 - 13x + 6$

For 3 - 8, find the complete factorization and all zeros of the following polynomials using the information given.

3. $P(x) = 2x^5 - 5x^4 + x^3 + 4x^2 - 4x$

4. $P(x) = x^4 + 6x^3 + 2x^2 - 18x - 15$

5. $P(x) = x^4 - 5x^3 + 3x^2 + 15x - 18$

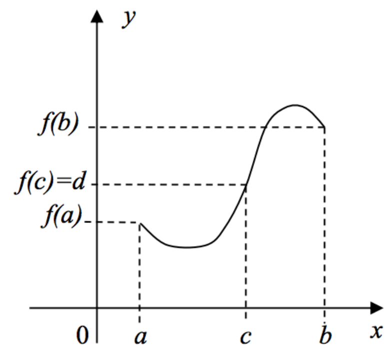
6. $P(x) = x^4 + 6x^3 + 7x^2 - 12x - 18$

7. $P(x) = x^4 + 3x^3 + 3x^2 + x$

8. $P(x) = 3x^4 - 11x^3 - 3x^2 - 6x + 8$

Intermediate Value Theorem

Let a and b be real numbers such that $a < b$. If f is a polynomial function such that $f(a) \neq f(b)$, then in the interval $[a, b]$, f takes on every value between $f(a)$ and $f(b)$.



This theorem helps locate the real zeros of a polynomial function. If $f(a)$ is positive real number, and another $f(b)$ is a negative number and $a < b$, you can conclude that the function has at least one real zero between these two variables

9. Use the Intermediate Value Theorem to prove that a zero exists on the interval $[1,2]$ of the function $f(x) = -x^3 + 2x^2 + 9x - 11$.

10. Use the Intermediate Value Theorem to prove that $f(x) = x^3 + x$ takes on the value 9 for some x in $[1,2]$.

11. Selected value of the continuous function f are shown in the table below. Is the following statement true or false?

$f(x) = 2$ has at least 1 solution in the interval $[0,7]$.

x	$f(x)$
0	4
3	1
4	−4
5	−12
7	−32

12. Selected value of the continuous function f are shown in the table below. Is the following statement true or false?

$f(x) = 5$ has at least 1 solution in the interval $[-3,2]$.

x	$f(x)$
−3	−2
0	10
1	11
2	8