Name:_____

1) Use $P(x) = 6x^5 - x^4 + x^3 + x^2 - 5x + 2$ to answer the following questions. Be sure to label your work clearly.

a) Use Descarte's Rule to find the possible numbers of positive, negative, and imaginary roots of P(x) and display them in a table.

b) Use the Rational Root Theorem to list **all possible rational** roots of P(x).

c) Use the Upper and Lower Bound rules to determine the upper and lower bounds

*d) Solve P(x)= 0 over the complex field **C**.

e) Give the prime factorization of P(x) *irreducible over the reals.*

f) Give the linear prime factorization of P(x) over the *complex number system.*

g) Sketch and label a graph on the back.

a)

P	N	I
4	1	0
2	1	2
0	1	4

b)

$\frac{p}{q}$: $\pm 1, \pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{6}$

$\pm 2, \pm\frac{2}{3}$

c)

		6	−1	1	1	−5	2
U.B.	1	6	5	6	7	2	$\boxed{4}$
*zero	−1	6	−7	8	−7	2	$\boxed{0}$ ✓
L.B.	$\frac{1}{2}$	6	−4	6	−4	$\boxed{0}$ ✓	
*zero		$6x^3-4x^2+6x-4$					
		$3x^3-2x^2+3x-2$					

d) Last is easiest

$-1, \frac{1}{2}, \frac{2}{3}, \pm i$

e)

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

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

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

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

*If you don't want or can't use grouping, you need to continue synthetic ÷ to find another zero

f)

$P(x) = (x+1)(2x-1)(3x-2)(x+i)(x-i)$

Name:_____