***AAT (IC/HW)-Days 1-2** Name Key

Chapter 4: 4-4 Complex & Rational Zeros of Polynomials Date: ________ Period: ________

A polynomial f(x) with real coefficients and leading coefficient 1 has the given zero(s) and degree. Express f(x) as a product of linear and quadratic polynomials with real coefficients that are irreducible over R.

1. $3+2i$; degree 2

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

$= x^2-6x+13$

2. $2, -2-5i$; degree 3

$(x-2)(x-(-2-5i))(x-(-2+5i))$

$= (x-2)(x^2+4x+29)$

3. $-1, 0, 3+i$; degree 4

$(x+1)(x)(x-(3+i))(x-(3-i))$

$= x(x+1)(x^2-6x+10)$

4. $4+3i, -2+i$; degree 4

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

$= (x^2-8x+25)(x^2+4x+5)$

5. $0, -2i, 1-i$; degree 5

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

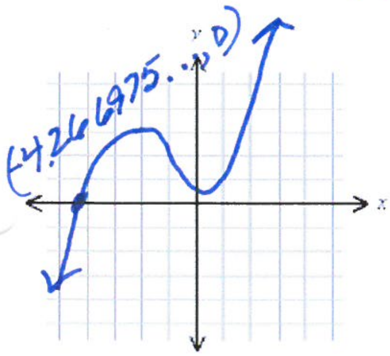
$= x(x^2+4)(x^2-2x+2)$

Show that the equation has no rational root.

6. $x^3 + 3x^2 - 4x + 6 = 0$

Possible Rat. Roots

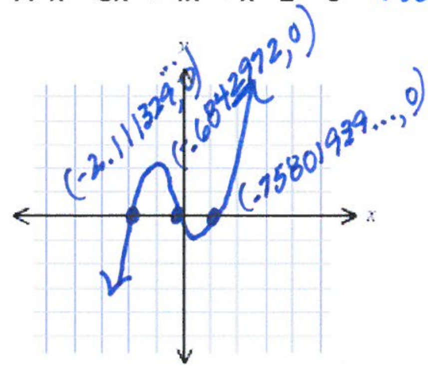
$\pm1, \pm2, \pm3, \pm6$



7. $x^5 - 3x^3 + 4x^2 + x - 2 = 0$

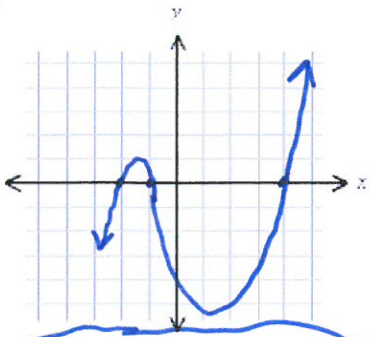
Possible Rat. Roots

$\pm1, \pm2$



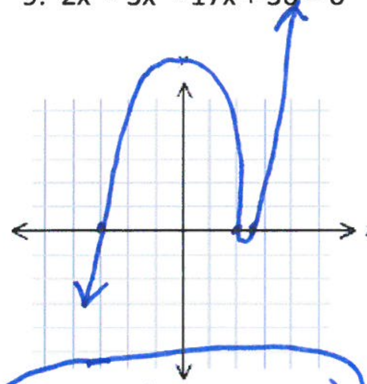
Find all solutions of the equation.

8. $x^3 - x^2 - 10x - 8 = 0$



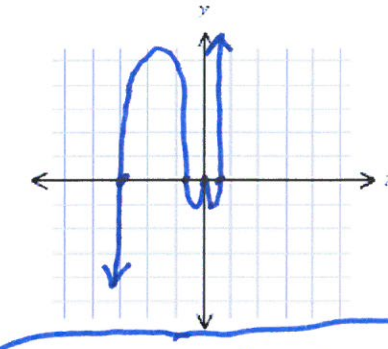
Zeros: $(-2, -1, 4)$

9. $2x^3 - 3x^2 - 17x + 30 = 0$



Zeros: $(-3, 2, 2.5)$

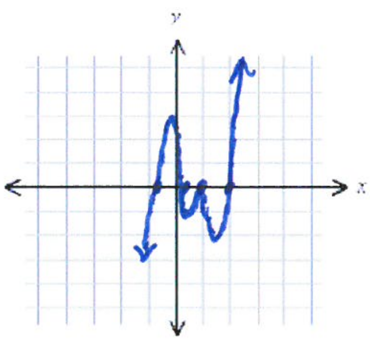
10. $6x^5 + 19x^4 + x^3 - 6x^2 = 0$



Zeros: $-3, -\frac{2}{3}, 0$ (mult. 2), $\frac{1}{2}$

Find a factored form with integer coefficients of the polynomial.

11. $f(x) = 6x^5 - 23x^4 + 24x^3 + x^2 - 12x + 4 = 0$



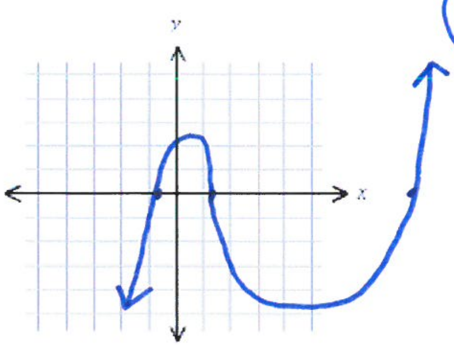
Zeros: $-\frac{2}{3}, \frac{1}{2}, 1$ (mult. 2), 2

$f(x) = 6(x + \frac{2}{3})(x - \frac{1}{2})(x-1)^2(x-2)$

$f(x) = 6(3x+2)(2x-1)(x-1)^2(x-2)$

12. The polynomial function $f(x) = 2x^3 - 25.4x^2 + 3.02x + 24.75$ has only real zeros. Use the graph of f to factor it.

$f(x) = 2(x+.9)(x-1.1)(x-12.5)$



Zeros: $-0.9, 1.1, 12.5$

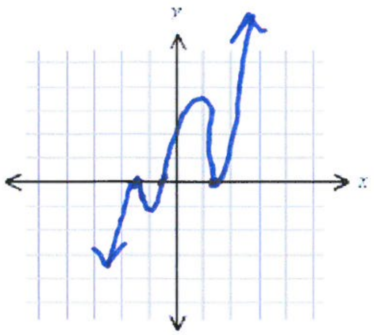
13. Does there exist a polynomial of degree 3 with real coefficients that has zeros 1, -1, and i? Justify.

No; if i is a root, then $-i$ is also a root

$\therefore$ would be of degree greater than 3.

Use a graph to determine the number of non real solutions of the equation.

14. $x^5 + 1.1x^4 - 3.21x^3 - 2.835x^2 + 2.7x + .62 = -1$

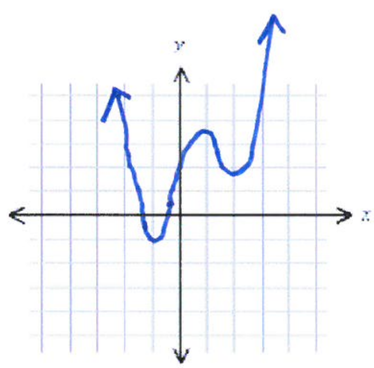


$y = x^5 + 1.1x^4 - 3.21x^3 - 2.835x^2 + 2.7x + 1.62$

zeros: -1.5 ; 1.2 , $-.5$
(mult 2) (mult. 2) (mult. 1)

No nonreal solutions

15. $x^4 - .4x^3 - 2.6x^2 + 1.1x + 3.5 = 2$



$y = x^4 - .4x^3 - 2.6x^2 + 1.1x + 1.5$

zeros: $-.6...$, $-1.4...$
(mult 1) (mult 1)

Two nonreal solutions