

121 Quiz 8 § 3.1-3.5 Polynomials

10pts (1) $f(x) = x^4 - 5x^3 + 7x^2 + 3x - 10$

Descartes: 3 or 1 pos. zeros

$f(-x) = x^4 + 5x^3 + 7x^2 - 3x - 10$ 1 neg. zero

Start with negatives.

Ratios: $\frac{p}{q} = \pm 1, \pm 2, \pm 5, \pm 10$

$$\begin{array}{r|rrrrrr} -1 & 1 & -5 & 7 & 3 & -10 \\ & & -1 & 6 & -13 & 10 \\ \hline 1 & 1 & -6 & 13 & -10 & 0 \\ & & 1 & -5 & \text{New } p & \\ \hline & 1 & -5 & 8 & & \end{array}$$

Sweet Done w/ negatives.

$$\begin{array}{r|rrrr} 2 & 1 & -6 & 13 & -10 \\ & & 2 & -8 & 10 \\ \hline & 1 & -4 & 5 & 0 \end{array}$$

$$(x+1)(x-2)(x^2-4x+5) = f(x)$$

$x^2 - 4x + 5 = 0$

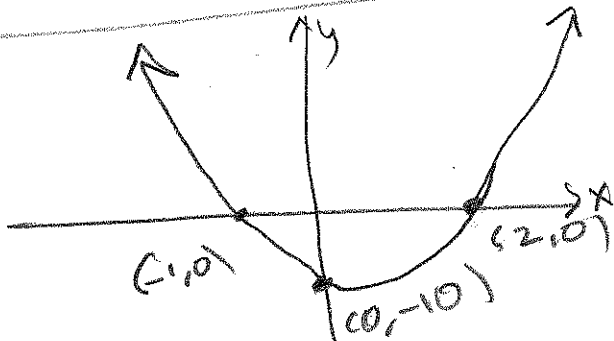
$a=1, b=-4, c=5$

$b^2 - 4ac = (-4)^2 - 4(1)(5) = 16 - 20 = -4 < 0$ No real roots

10pts (2) $x = \frac{4 \pm \sqrt{-4}}{2(1)} = \frac{4 \pm 2i}{2} = 2 \pm i$

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

10pts (3)



121 Quiz 8 §3.1-3.5 Polynomials

① $f(x) = x^4 - 4x^3 - 5x^2 + 38x - 30$

10pts Descartes 3 or 1 positive zeros

$f(-x) = x^4 + 4x^3 - 5x^2 - 38x - 30$ Exactly one negative zero

$\pm 1, \pm 2, \pm 3, \pm 5, \pm 6, \pm 10, \pm 15, \pm 30$

start w/ negative zeros & be done with negatives

$$\begin{array}{r|rrrrr} -1 & 1 & -4 & -5 & 38 & -30 \\ & & -1 & 5 & 0 & -38 \\ \hline & 1 & -5 & 0 & 38 & \text{Newp} \end{array}$$

$$\begin{array}{r|rrrrr} -2 & 1 & -4 & -5 & 38 & -30 \\ & & -2 & 12 & -14 & -48 \\ \hline & 1 & -6 & 7 & 24 & \text{Newp} \end{array}$$

$$\begin{array}{r|rrrrr} -3 & 1 & -4 & -5 & 38 & -30 \\ & & -3 & 21 & -48 & 30 \\ \hline & 1 & -7 & 16 & -10 & 0 \end{array} \quad (x+3)(x^3 - 7x^2 + 16x - 10)$$

$$\begin{array}{r|rrrrr} 1 & 1 & -7 & 16 & -10 & 0 \\ & & 1 & -6 & 10 & \\ \hline & 1 & -6 & 10 & 0 & \end{array}$$

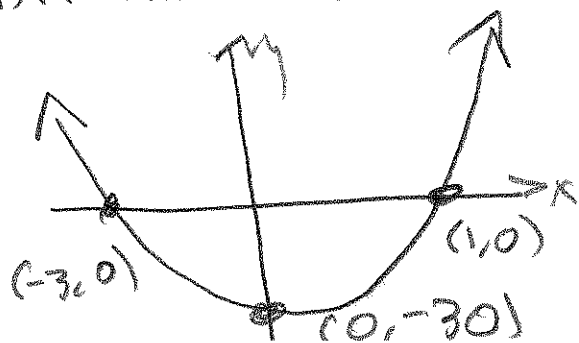
$$(x+3)(x-1)(x^2 - 6x + 10) = f(x)$$

$b^2 - 4ac = (-6)^2 - 4(1)(10)$

$= 36 - 40 = -4$ No more Real zeros

$x = \frac{6 \pm \sqrt{-4}}{2(1)} = \frac{6 \pm 2i}{2} = 3 \pm i$

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



Very Rough sketch

③ 10pts