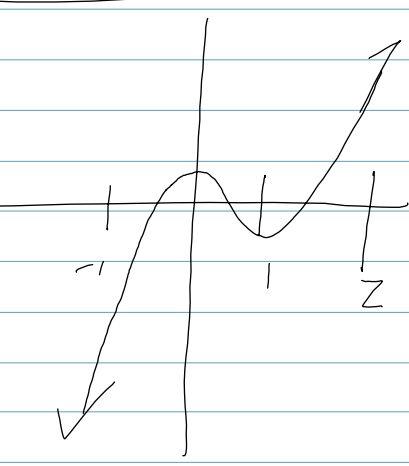
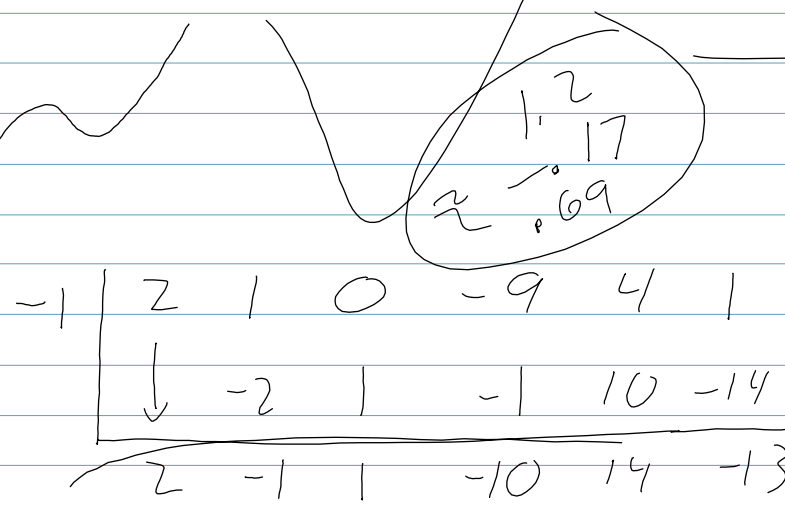


4.2 Real Zeros of a Polynomial

- Find All Rational zeros
- Use the Factor theorem
- Factor a Poly. completely
- Find lower + upper Bounds of zeros

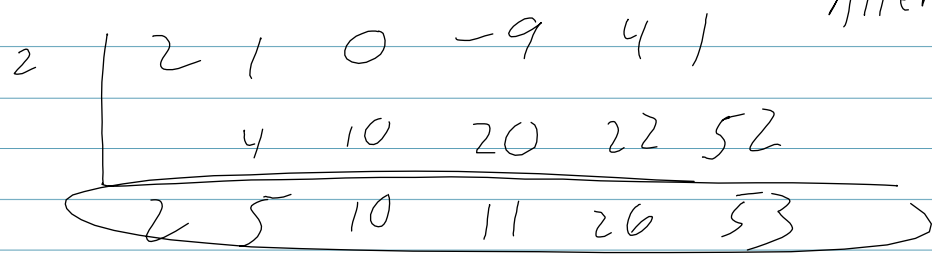
$$f(x) = 2x^5 + x^4 - 9x^2 + 4x + 1$$

Bound test.
Lower + upper
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-1 is the lower Bound

Alternating signs!



2 is the upper Bound
All positive + 0

4.2 Con't

$$f(x) = x^5 - 5x^4 + 8x^3 - 8x^2 + 7x - 3$$

Possible Rational Zeros

$$\frac{\pm 1}{1} \quad \frac{\pm 3}{1} \quad \frac{\pm 1}{2} \quad \frac{\pm 3}{2}$$

$$\frac{\pm 1}{1} \quad \frac{\pm 3}{1}$$

Zeros 1, 1, 3

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

$$\begin{array}{r|rrrrrr} 1 & 1 & -5 & 8 & -8 & 7 & -3 \\ & & 1 & -4 & 4 & -4 & 3 \end{array}$$

$$a = 1$$

$$b = 0$$

$$c = 1$$

$$\begin{array}{r|rrrrrr} 1 & 1 & -4 & 4 & -4 & 3 & 0 \\ & & 1 & -3 & 1 & -3 & \end{array}$$

$$x = \frac{0 \pm \sqrt{0 - 4}}{2}$$

$$\begin{array}{r|rrrrr} 3 & 1 & -3 & 1 & -3 & 0 \\ & & 3 & 0 & 3 & \end{array}$$

$$x = \frac{\pm \sqrt{-4}}{2} = \frac{\pm 2i}{2}$$

$$1 \quad 0 \quad 1 \quad 0$$

$$\sqrt{-4} = \sqrt{4} \cdot \sqrt{-1}$$

$$x = \pm i$$

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

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$$1 \pm \sqrt{3}$$

$$1 + \sqrt{3}$$

$$1 - \sqrt{3}$$

$$\frac{(x - (1 + \sqrt{3}))}{(x - (1 - \sqrt{3}))}$$

4.2
3
3-42