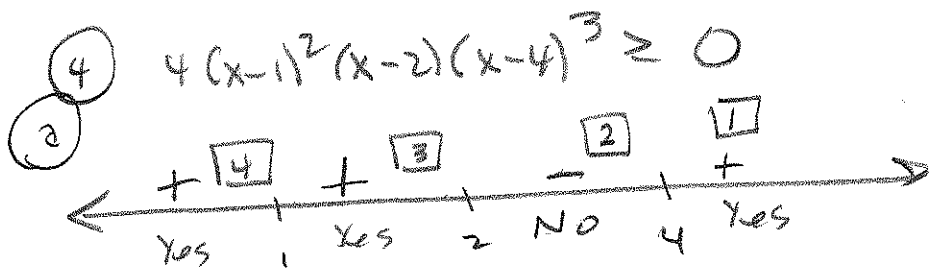


① $(x+2)(x-5)^2(x-(7+2i))(x-(7-2i)) = P(x)$

② $(x-3+2i)(x-3-2i) = x^2 - 3x - 2ix - 3x + 9 + 6i + 2ix - 6i - 4i^2$
 $= x^2 - 6x + 9 + 4 = x^2 - 6x + 13$

③
$$\begin{array}{r} x^2-3 \overline{) 5x^3+3x^2+0x-4} \\ \underline{-(5x^3 \quad -15x)} \\ 3x^2+15x-4 \end{array}$$

$y = 5x + 3$ is slant asymptote for $\frac{5x^3+3x^2-4}{x^2-3}$

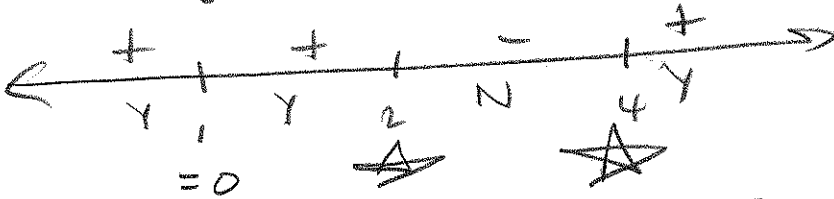


- ① $4(5-1)^2(5-2)(5-4)^3 = 4(4)^2(3)(1)^3$ is positive? +
 - ② $(x-4)^3$ controls, 3 is odd sign changes -
 - ③ $x-2 = (x-2)^1$ controls, 1 is odd, changes sign +
 - ④ $(x-1)^2$ controls, 2 is even, No sign change +
- $x \in (-\infty, 2] \cup [4, \infty)$

(4) (b)

$$\frac{4(x-1)^2}{(x-2)(x-4)^3} \geq 0$$

Same sign pattern, but can't let $x=2$ or $x=4$



$$x \in (-\infty, 2) \cup (4, \infty)$$

(5) $f(x) = x^4 - 4x^3 + 4x^2 + 4x - 5$ has zeros (a) $x = \pm 1$

Break it down / split it into linear factors.

$$\begin{array}{r|rrrrr} 1 & 1 & -4 & 4 & 4 & -5 \\ & & 1 & -3 & 1 & 5 \\ \hline -1 & 1 & -3 & 1 & 5 & 0 \\ & & -1 & 4 & -5 & \\ \hline & 1 & -4 & 5 & 0 & \end{array}$$

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

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

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

$$(x-2)^2 = -1$$

$$x-2 = \pm i$$

$$x = 2 \pm i$$

$$\begin{array}{l} \text{Zeros:} \\ x = \pm 1, 2 \pm i \end{array}$$

$f(x)$ factors into

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