

Descartes' Rule of signs

Question 1:

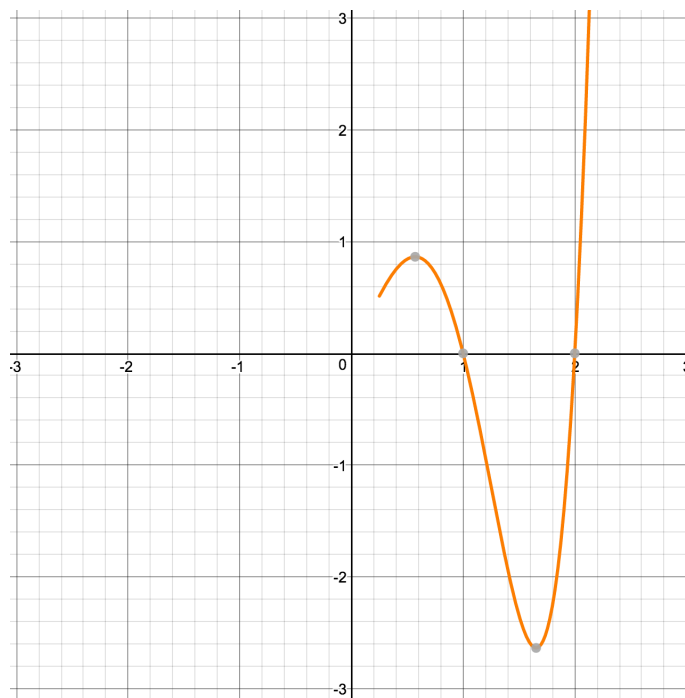
P(x)	Sign Variations	Possible Positive roots	Actual positive roots	Sign variations of P(-x)	Possible negative roots	Actual negative roots
$x^2 - x + 1$						
$x^2 - 4x + 1$						
$x^2 - 2x + 1$						
$x^2 - ?_x + 1$					1	
$x^6 - x^5 + x^4$ $- x^3 + x^2$ $- x + 1$						
$x^6 - x^5 + x^4$ $- x^3 + x^2$ $- x + 0$						

Question 2:

My assignment was to plot a given polynomial $P(x)$. I started plotting it (you can see the graph below), but ran out of ink mid-way. I can't remember the original polynomial, but I do remember the following facts:

1. It was a 5th degree polynomial.
2. $P(0) = 0$
3. $P(-1) = 0$
4. It didn't have any additional x-intercepts, other than the above and the ones in the graph.
4. $P(-0.5)$ was a negative value
4. The graph was heading toward the bottom left of the grid.

Can you help me find the polynomial, and then complete the graph?

**Question 3:**

Another question I had was to plot a 4th order polynomial. Only this time I lost both the graphing paper AND the question itself. I do remember the following:

1. The graph had an axis of symmetry about the line $x=1$.
2. The polynomial had a zero at $x=-1$.
3. The polynomial had a zero at $x=2$.
4. The graph went through the point $(1,2)$.

Can you find the polynomial equation and then plot the graph? (you can use the same graph paper as above).