

Quiz 10

5 November 2009

Show all work to support your solutions. Be sure to check your solutions.

Consider the polynomial function

$$p(x) := x^4 - 4x^3 + 2x^2 + 8x - 8$$

1. (3 Points) List all possible rational zeroes of p and determine which are actual zeroes of p .

Factors of constant term: 1, 2, 4, 8

Factors of lead coefficient: 1

Possible Rational Zero	Function Value
1	-1
-1	-9
2	0
-2	32
4	56
-4	504
8	2232
-8	6200

Actual Rational Zeros: 2

2. (3 Points) Factor p completely into linear factors.

Synthetic Division:

$$\begin{array}{r|rrrrrr} 2 & 1 & -4 & 2 & 8 & -8 \\ & & 2 & -4 & -4 & 8 \\ \hline 2 & 1 & -2 & -2 & 4 & 0 \\ & & 2 & 0 & -4 & \\ \hline & 1 & 0 & -2 & 0 & \end{array}$$

Zeros of Quotient:

$$\begin{aligned} x^2 - 2 &= 0 \\ x^2 &= 2 \\ x &= \pm\sqrt{2} \end{aligned}$$

Thus, $p(x) = (x - 2)^2(x - \sqrt{2})(x + \sqrt{2})$.

3. (1 Point) State the multiplicity of each zero of p .

Zero	Multiplicity
2	2
$\sqrt{2}$	1
$-\sqrt{2}$	1

4. (1 Point) Determine the end behavior for p .

Leading coefficient: $1 > 0$

Degree: 4, even

Thus, p increases without bound as x increases without bound, and p increases without bound as x decreases without bound.

5. (2 Points) Sketch a graph of p on the axes provided.

