Solve higher degree polynomial equations

Step 1: Find the number of rational roots using Descartes' Rule

Step 2: Find all possible rational roots

Step 3: Use synthetic division to find zeros.

Example: $2x^4 - 5x^3 - 8x^2 + 25x - 10 = 0$

R+	R-	I
3	1	0
1	1	2

p $\pm 1, \pm 2, \pm 5, \pm 10$

q 1, 2

p/q $\pm 1, \pm 2, \pm 5, \pm 10, \pm \frac{1}{2}, \pm \frac{5}{2}$

	2	-5	-8	25	-10	
1	2	-3	-11	14	4	1 is not a root
2	2	-1	-10	5	0	2 is a root

New polynomial: $2x^3 - x^2 - 10x + 5$

	2	-1	-10	5	
-2	2	-5	0	5	not a root
5	2	9	35	180	upper bound (all signs the same)
-5	2	-11	45	-220	lower bound (altering signs)
$\frac{1}{2}$	2	0	-10	0	$\frac{1}{2}$ is zero, therefore $x - 1 / 2$ is a Factor

Factor form: $(x-2)(x-1/2)(2x^2-10)=0$

$x = 2$

$x = \frac{1}{2}$

$x = \pm\sqrt{5}$

$2x^2 - 10 = 0$

$2x^2 = 10$

$x^2 = 10$

$x = \pm\sqrt{5}$