Algebra II

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2)	No ℚ, can't Find	7)	$\{\frac{1}{2}, -2 \pm i\}$	22)	$\{-\frac{1}{2}, 1 \pm i\}$
4)	$\{-1, -2, \pm\sqrt{3}\}$	8)	$\{-\frac{1}{2}, -1, 4\}$	23)	$\{-\frac{3}{2}, \pm i\sqrt{2}\}$
5)	$\{3, -1, -1 \pm 2i\}$	10)	$\{-\frac{1}{2}, \pm 2i\}$ ($-\frac{1}{2}$ is a double root!)	24)	$\{\frac{2}{5}, \pm\frac{1}{2}i\}$
6)	No ℚ, can't Find	12)	$\{\frac{1}{2}, \frac{2}{3}, \pm i\}$		

2) $x^3+x^2-4x+4=0$

Can't Find 'em

+	−	i
2	1	0
0	1	2

ℚ $\pm 1, 2, 4$

	1	1	−4	4
−1		−1	0	4
	1	0	−4	8
−2		−2	2	4
	1	−1	−2	8
−3		−3	6	−6
L.B.	1	−2	2	−2

	1	1	−4	4
1		1	2	−2
	1	2	−2	2
2		2	6	4
U.B.	1	3	2	8

4) $x^4+3x^3-x^2-9x-6=0$ Lucas 6 $\{-1, -2, \pm\sqrt{3}\}$

+	−	i
1	3	0
1	1	2

ℚ $\pm 1, 2, 3, 6$

	1	3	−1	−9	−6
−1		−1	−2	3	6
	1	2	−3	−6	0
−2		−2	0	6	
	1	0	−3		0

$x^2-3=0$

$\sqrt{x^2}=\sqrt{3}$

$|x|=\sqrt{3}$

$\pm\sqrt{3}$

$x^2-3=0$

5) $x^4-2x^2-16x-15=0$ $\{-1, 3, -1 \pm 2i\}$

+	−	i
1	3	0
1	1	2

ℚ $\pm 1, 3, 5, 15$

	1	0	−2	−16	−15
−1		−1	1	1	15
	1	−1	−1	−15	0
−2		−2	6	−10	
	1	−3	5	−25	

Lower Bound

	1	−1	−1	−15
1		1	0	−1
	1	0	−1	−16
2		2	2	2
	1	1	1	−13
3		3	6	15
	1	2	5	0

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

$\frac{-2\pm\sqrt{4-4(1)(5)}}{2(1)} = \frac{-2\pm\sqrt{-16}}{2} = \frac{-2\pm 4i}{2} = -1\pm 2i$

6) $x^4+3x^2-8x+10=0$

+	−	i
2	0	2
0	0	4

ℚ $\pm 1, 2, 5, 10$

Can't Find 'em

	1	0	3	−8	10
1		1	1	4	−4
	1	1	4	−4	6
2		2	4	14	12
	1	2	7	6	22

UPPER BOUND

7) $2x^3+7x^2+6x-5=0$

8) $2x^3-5x^2-11x-4=0$

10) $4x^4+4x^3+17x^2+16x+4=0$ [1 or 2, 4] [1 or 2 or 4]

+	−	i
0	4	0
0	2	2
0	0	4

$\left\{-\frac{1}{2}, \pm 2i\right\}$

Q: $\pm 1, \pm 2, \pm 4, \pm \frac{1}{2}, \pm \frac{2}{2}, \pm \frac{4}{2}, \pm \frac{1}{4}, \pm \frac{2}{4}, \pm \frac{4}{4}$

	4	4	17	16	4
-1		-4	0	-17	1
	4	0	17	-1	5
-2		-8	8	-50	68
	4	-4	25	-34	72

LOWER BOUND

$4x^2=-16$

$\sqrt{x^2}=\sqrt{-4}$

$x=\pm 2i$

	4	4	17	16	4
$-\frac{1}{2}$		-2	-1	-8	-4
	4	2	16	8	0
$-\frac{1}{4}$		-1	-4	-2	-1
	4	1	16	4	0
$-\frac{1}{2}$		-2	0	-8	
	4	0	16		0

$4x^2+16=0$

12) $6x^4-7x^3+8x^2-7x+2=0$ [1 or 2, 2 or 3] [1 or 2]

+	−	i
4	0	0
2	0	2
0	0	4

$\left\{\frac{1}{2}, \frac{2}{3}, \pm i\right\}$

Q: $\pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{2}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{1}{6}, \pm \frac{2}{6}$

	6	-7	8	-7	2
1		6	-1	7	0
	6	-1	7	0	2
2		12	10	36	58
	6	5	18	29	60

UPPER BOUND

	6	-7	8	-7	2
$\frac{1}{2}$		3	-2	3	-2
	6	-4	6	-4	0
$\frac{2}{3}$		4	0	4	
	6	0	6	0	

$6x^2+6=0$

$6x^2=-6$

$\sqrt{x^2}=\sqrt{-1}$ $x=\pm i$

22) $\frac{1}{3}x^3-\frac{1}{2}x^2+\frac{1}{3}x+\frac{1}{3}=0$

23) $\frac{1}{3}x^3+\frac{1}{2}x^2+\frac{2}{3}x+1=0$

24) $2x^3-.8x^2+.5x-.2=0$