

2.) 9	18.) $\{-2, -3, \frac{1}{2}\}$
4.) 31	20.) $\{\frac{3}{2}, -1 \pm \sqrt{2}\}$
6.) $\frac{4}{3}$	22.) $x^3 + 3x^2 - 4x - 12 = 0$
8.) $\frac{9}{4}$	24.) $x^3 + 2x^2 + x + 2 = 0$
10.) Yes	26.) $2x^3 - 3x^2 - 5x + 6 = 0$
12.) Yes	28.) $x^3 - 5x^2 + 11x - 15 = 0$
14.) No	30.) $\{-2, 3, 2, -\frac{1}{2}\}$
16.) Yes	32.) $\{2, -\frac{1}{2}, \pm i\}$

2)  $P(x) = x^3 + 4x^2 - 8x - 6 \quad c = -5$

	1	4	-8	-6
-5		-5	5	15
	1	-1	-3	9 ←

16)  $z + 2i : P(z) = z^3 + z^2 + 4z + 4$

	1	1	4	4
-2i		-2i	-4-2i	-4
	1	(1-2i)	-2i	0

Yes

18)  $2x^3 + 9x^2 + 7x - 6 = 0 \quad \{-2, \frac{1}{2}, -3\}$

	2	9	7	-6
-2		-4	-10	6
	2	5	-3	0

$2x^2 + 5x - 3 = 0$   
 $(2x - 1)(x + 3) = 0$   
 $\frac{1}{2} \quad -3$

20)  $2z^3 + z^2 - 8z + 3 = 0 ; \{\frac{3}{2}, -1 \pm \sqrt{2}\}$

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

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

$x^2 + 2x - 1 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-2 \pm \sqrt{2^2 - 4(1)(-1)}}{2(1)}$

$= \frac{-2 \pm \sqrt{8}}{2} = \frac{-2 \pm \sqrt{4 \cdot 2}}{2} = \frac{-2 \pm 2\sqrt{2}}{2}$

24)  $\{-2, -i, i\}$

$x = -2 \quad x = -i \quad x = i$   
 $x + 2 = 0 \quad x + i = 0 \quad x - i = 0$

$(x + 2)(x + i)(x - i) = 0$

$(x + 2)(x^2 + 1) = 0$

$x^3 + 2x^2 + x + 2 = 0$

28)  $\{3, 1 + 2i, 1 - 2i\}$

$x = 3 \quad x = 1 + 2i \quad x = 1 - 2i$   
 $(x - 3)(x - 1 - 2i)(x - 1 + 2i) = 0$

$(x - 3)(x^2 - x + 2xi - x + 1 - 2i - 2xi + 2i - 4i^2) = 0$

$(x - 3)(x^2 - 2x + 5) = 0$

$x^3 - 2x^2 + 5x - 3x^2 + 6x - 15 = 0$

$x^3 - 5x^2 + 11x - 15 = 0$

30)  $2x^4 - 5x^3 - 11x^2 + 20x + 12 = 0$   $\{ -2, 3, 2, -\frac{1}{2} \}$

	<del>2</del>	<del>-5</del>	<del>11</del>	<del>20</del>	<del>12</del>	
-2		4	18	-14	-12	
	<u>2</u>	<u>-9</u>	<u>7</u>	<u>6</u>	0	
3		6	-9	6		
	<u>2</u>	<u>-3</u>	<u>-2</u>	0		

$$2x^2 - 3x - 2 = 0$$

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