

p83

$$15 \quad x^4 - 10x^2 + 9 = 0 \quad \rightarrow a = x^2$$

$$a^2 - 10a + 9 = 0$$

$$(a-1)(a-9) = 0$$

$$(x^2-1)(x^2-9) = 0$$

$$(x+1)(x-1)(x+3)(x-3) = 0$$

$$x = \pm 1 ; \pm 3$$

$$21 \quad 2x^3 - 7x + 2 = 0$$

$$\text{Poss roots: } \frac{\pm 1}{\pm 1} \frac{\pm 2}{\pm 2} = \pm 1, \pm \frac{1}{2}; \pm 2$$

1	2	0	-7	2		2	0	-7	2
		2	2	-5			-2	2	5
	2	2	-5	3			2	-2	-5
2	2	0	-7	2		2x ³	0	-7	2
		4	8	2	-2		-4	8	-3
	2	4	1	4		2x ²	-4x	+1	0

$$2x^2 - 4x + 1 = 0$$

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

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

$$33 \quad y = 4x^2 - x^4$$

$$y = 4$$

$$4x^2 - x^4 = 4$$

$$x^4 - 4x^2 + 4 = 0 \quad \rightarrow a = x^2$$

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

$$(a-2)^2 = 0$$

$$(x^2-2)^2 = 0$$

$$x^2 - 2 = 0 \quad \rightarrow x = \pm\sqrt{2}$$

$$y = 4$$

$$(\sqrt{2}, 4) \quad (-\sqrt{2}, 4)$$

p89 #9-23(0)

$$9 \quad 4x^2 - 3x + 6 = 0$$

$$\text{sum} = \frac{-(-3)}{4} = \frac{3}{4}$$

$$\text{product} = \frac{6}{4} = \frac{3}{2} \quad (\text{even exp})$$

$$11 \quad 3x^3 + 5x^2 - x - 2 = 0$$

$$\text{sum} = \frac{-(5)}{3} = -\frac{5}{3}$$

$$\text{product} = \ominus \frac{-2}{3} = \frac{2}{3} \quad \text{odd exp}$$

$$13 \quad (1+i) + (1-i) = 2 \rightarrow \text{sum of roots}$$

$$(1+i)(1-i) = 1 + i - i - i^2 = 1 - (-1) = 2 \quad (\text{product})$$

Equation: $x^2 - \text{sum} + \text{product}$

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

$$15 \quad (3+\sqrt{2}) + (3-\sqrt{2}) = 6 \rightarrow \text{sum}$$

$$(3+\sqrt{2})(3-\sqrt{2}) = 9 + 3\sqrt{2} - 3\sqrt{2} - 2 = 7 \rightarrow \text{prod}$$

$$x^2 - 6x + 7 = 0$$

17 $2+i\sqrt{5}$ is a root so $2-i\sqrt{5}$ is also a root
third root = x .

$$\text{sum of roots} = (2+i\sqrt{5}) + (2-i\sqrt{5}) + x$$

$$= 4+x.$$

$$y = ax^3 + 0x^2 + cx + d.$$

$$\text{sum of roots} = \frac{-0}{a} = 0$$

$$\rightarrow 4+x=0$$

$$x = -4.$$

$$\begin{aligned}
 19 \quad & (4+i) + (4-i) = 8 \\
 & (4+i)(4-i) = 16 - i^2 = 17 \\
 & (x^2 - 8x + 17)(x - 2) = \\
 & \quad x^3 - 8x^2 + 17x \\
 & \quad - 2x^2 + 16x - 34 \\
 & \hline
 & x^3 - 10x^2 + 33x - 34 = 0
 \end{aligned}$$

$$\begin{aligned}
 23 \quad & (5+i\sqrt{3}) + (5-i\sqrt{3}) = 10 \quad (\text{sum}) \\
 & (5+i\sqrt{3})(5-i\sqrt{3}) = 25 - 3i^2 = 28 \quad (\text{product}) \\
 & (x^2 - 10x + 28)
 \end{aligned}$$

$$\begin{aligned}
 \text{sum} \quad & i + -i = 0 \quad \rightarrow \quad x^2 - 0x + 1 = (x^2 + 1) \\
 \text{product} \quad & i(-i) = -i^2 = 1 \\
 & (x^2 + 1)(x^2 - 10x + 28) \\
 & \quad x^4 - 10x^3 + 28x^2 \\
 & \quad + x^2 - 10x + 28 \\
 & \hline
 & x^4 - 10x^3 + 29x^2 - 10x + 28 = 0
 \end{aligned}$$

p 93

$$12 \quad 2x^3 - 5x^2 - x + 8 = 0$$

$$\text{sum} = \ominus \frac{-5}{2} = \frac{5}{2}; \quad \text{product} = \ominus \frac{8}{2} = -4$$

leading term: odd exp.

↓

leading term
even exp

$$\begin{aligned}
 13 \quad & \text{sum} \quad 3i + -3i = 0 \\
 & \text{product} \quad (3i)(-3i) = -9i^2 = 9 \\
 & (x^2 - 0x + 9)(x + 5) \\
 & (x^2 + 9)(x + 5) \Rightarrow x^3 + 5x^2 + 9x + 45 = 0
 \end{aligned}$$

$$x^2 - 0x + 9$$