

HM3

Name Key Fall 16

## Writing Equations Given Zeros

A polynomial function with rational coefficients has the following zeros. Find all additional zeros. DO NOT WRITE THE EQUATION OF THE FUNCTION.

1)  $-3 + 2i, -3 + \sqrt{6}$

$$-3 - 2i \quad -3 - \sqrt{6}$$

2)  $\sqrt{6}, 1 + i$

$$-\sqrt{6} \quad 1 - i$$

3)  $3 + \sqrt{10}, 3 + \sqrt{7}$

$$3 - \sqrt{10} \quad 3 - \sqrt{7}$$

4)  $-2i, -2 + \sqrt{3}$

$$2i \quad -2 - \sqrt{3}$$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

5)  $\frac{2}{3}, 1 + 3i, 2i$

$$f(x) = 3x^5 - 8x^4 + 46x^3 - 52x^2 + 136x - 80$$

6) 3 mult. 2, 0, -5

$$f(x) = x^4 - x^3 - 21x^2 + 45x$$

7) 0 mult. 3

$$f(x) = x^3$$

8) 1,  $2 + \sqrt{7}$

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

9)  $-2$  mult. 3

$$f(x) = x^3 + 6x^2 + 12x + 8$$

10)  $-1, 2 - i$

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

11) 4,  $-i$

$$f(x) = x^3 - 4x^2 + x - 4$$

12)  $-1$  mult. 2, 2

$$f(x) = x^3 - 3x - 2$$

13)  $\frac{4}{3}, -3i$

$$f(x) = 3x^3 - 4x^2 + 27x - 36$$

14)  $-4, 4, -\frac{1}{4}$

$$f(x) = 4x^3 + x^2 - 64x - 16$$

5)  $x = 2/3, 1+3i, 2i$

$(x - 2/3) \quad 1-3i \quad -2i$

☆  $(3x-2)$  sum:  $\boxed{2}$  sum:  $\boxed{0}$

prod:  $\boxed{1-9i^2}$  prod:  $\boxed{4}$   
 $\boxed{10}$

HW 2 WORKED OUT

$$(3x-2)(x^2-2x+10)(x^2+4)$$

$$(3x-2)(x^4+4x^2-2x^3-8x+10x^2+40)$$

$$(3x-2)(x^4-2x^3+14x^2-8x+40)$$

$$3x^5 - 6x^4 + 42x^3 - 24x^2 + 120x - 2x^4 + 4x^3 - 28x^2 + 16x - 80$$

$$f(x) = 3x^5 - 8x^4 + 46x^3 - 52x^2 + 136x - 80$$

⑥ 3 mult. 2, 0, -5  
 $(x-3)(x-3)x(x+5)$   
 $x(x^2-6x+9)(x+5)$   
 $(x^3-6x^2+9x)(x+5)$   
 $x^4+5x^3-6x^3-30x^2+9x^2+45x$

$f(x) = x^4 - x^3 - 21x^2 + 45x$

⑧ 1,  $2+\sqrt{7}$   
 $2-\sqrt{7}$   
sum: 4  
product:  $4-7=-3$

$(x-1)(x^2-4x-3)$   
 $x^3-4x^2-3x-x^2+4x+3$

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

⑩ -1,  $2-i$  sum: 4  
 $2+i$  prod:  $4-i^2$

$(x+1)(x^2-4x+5)$  ⑤  
 $x^3-4x^2+5x+x^2-4x+5$

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

⑦ 0 mult. 3  
 $(x)(x)(x)$

$y = x^3$

⑨ -2 mult. 3  
 $(x+2)(x+2)(x+2)$   
 $(x+2)(x^2+4x+4)$

$x^3+4x^2+4x+2x^2+8x+8$

$f(x) = x^3 + 6x^2 + 12x + 8$

⑪ 4,  $-i$  sum: 0  
 $i$  prod:  $-i^2 = 1$   
 $(x-4)(x^2+1)$

$x^3+x-4x^2-4$

$f(x) = x^3 - 4x^2 + x - 4$

12) -1 mult. 2, 2

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

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

$$x^3-2x^2+2x^2-4x+x-2$$

$$f(x) = x^3 - 3x - 2$$

13)  $\frac{4}{3}$ ,  $-3i$ ,  $3i$

$$(3x-4) \quad \begin{array}{l} \text{sum: } 0 \\ \text{prod: } -9i^2 \rightarrow 9 \end{array}$$

$$(3x-4)(x^2+9)$$

$$3x^3+27x-4x^2-36$$

$$f(x) = 3x^3 - 4x^2 + 27x - 36$$

14) -4, 4,  $-\frac{1}{4}$

$$(x+4)(x-4)(4x+1)$$

$$(x^2-16)(4x+1)$$

$$4x^3+x^2-64x-16$$

$$f(x) = 4x^3 + x^2 - 64x - 16$$