

Sec 3.4

Writing polynomials given the zeros

Write a polynomial given the zeros are -2, 2 and i and that $f(3) = -150$

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

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

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

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

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

$$f(x) = x^4 - 3x^2 - 4 \leftarrow$$

$$-150 = c(3^4 - 3(3)^2 - 4)$$

$$-150 = c(50)$$

$$-3 = c$$

$$f(x) = -3x^4 + 9x^2 + 12$$

ans. ✓

Write a polynomial that has zeros 3, 4, and $2i$ and $f(-1) = -50$

$$x=3 \quad x=4 \quad x=2i \quad x=-2i$$
$$x-3=0 \quad x-4=0 \quad x-2i=0 \quad x+2i=0$$

$$(x-3)(x-4)(x-2i)(x+2i)$$
$$(x^2-7x+12)(x^2+4)$$

$$x^4 - 7x^3 + 12x^2 + 4x^2 - 28x + 48$$

$$x^4 - 7x^3 + 16x^2 - 28x + 48$$
$$\rightarrow -\frac{1}{2}x^4 + \frac{7}{2}x^3 - 8x^2 + 14x - 24 \quad \leftarrow$$
$$-50 = c \left((-1)^4 - 7(-1)^3 + 16(-1)^2 - 28(-1) + 48 \right)$$
$$-50 = c [1 + 7 + 16 + 28 + 48]$$
$$-50 = 100c$$
$$-\frac{1}{2} = c$$

Write a polynomial that has zeros -4 , $1/3$, $2+3i$ and $f(1) = 100$

Suggested Practice

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25, 27, 29, 31, 30

$$25. \quad 2x^3 - 2x^2 + 50x - 50$$

$$27. \quad x^3 - 3x^2 - 15x + 125$$

$$29. \quad x^4 + 10x^2 + 9$$

$$31. \quad x^4 - 9x^3 + 21x^2 + 21x - 130$$