

Algebra 4.3 Zeros of Polynomials

Find the following polynomials w/ their given conditions

① zeros: 4, 1, -3 $f(-1) = 100$

$$f(x) = a(x-4)(x-1)(x+3)$$

$$100 = a(-1-4)(-1-1)(-1+3)$$

$$100 = a(-5)(-2)(2) \quad 100 = 20a \quad a = 5$$

$$f(x) = 5(x-4)(x-1)(x+3) \quad \checkmark \text{ stop here on tests}$$

$$f(x) = (5x-20)(x^2+2x-3)$$

$$f(x) = 5x^3 + 10x^2 - 15x - 20x^2 - 40x + 60$$

$$f(x) = 5x^3 - 10x^2 - 55x + 60 \quad \checkmark \text{ stop here for iLrn}$$

② zeros: 4, 2i, -2i $f(-1) = -125$

$$f(x) = a(x-4)(x-2i)(x+2i)$$

$$-125 = a(-1-4)(-1-2i)(-1+2i)$$

$$-125 = a(-5)(1-4i^2)$$

$$-125 = a(-5)(5)$$

$$-125 = -25a \quad a = 5$$

$$f(x) = 5(x-4)(x-2i)(x+2i) \quad \checkmark \text{ stop here for tests, multiply for iLrn}$$

③ zeros: -3, -4 w/ multiplicity of 2 for both, leading coefficient = -1

$$f(x) = -1(x+3)^2(x+4)^2 \quad \checkmark \text{ stop here for tests, multiply for iLrn}$$

④ zeros: -1, 2 both multiplicity of 2, 0 multiplicity of 3, $f(2) = 144$

$$f(x) = a(x+1)^2(x-2)^2x^3$$

$$144 = a(2+1)^2(2-2)^22^3$$

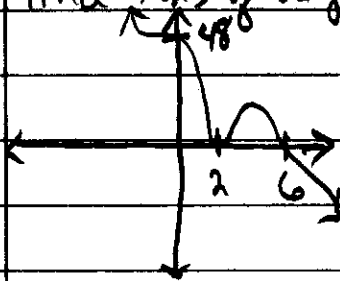
$$144 = a(9)(1)(8)$$

$$144 = 72a \quad a = 2$$

$$f(x) = 2x^3(x+1)^2(x-2)^2$$

Alg 4.3 cont.

Find $f(x)$ of degree 3, with it's graph below



$$f(0) = 48$$

$$f(x) = a(x-2)^2(x-6)$$

$$48 = a(0-2)^2(0-6)$$

$$48 = a(4)(-6)$$

$$48 = -24a \quad a = -2$$

$$f(x) = -2(x-2)^2(x-6)$$

Find the zeros of $f(x)$ & state the multiplicity of each zero

$$f(x) = -2x^3(x^2 - 8x + 15)^3(x^2 - 9)^2$$

zero multiplicity

0

3

5

3

3

5

-3

2

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

Show that 3 is a zero of multiplicity of 2, and express $f(x)$ as a product of linear factors. $f(x) = x^4 - 10x^3 + 33x^2 - 36x$

$$\begin{array}{r|rrrr} 3 & 1 & -10 & 33 & -36 \end{array}$$

$$\begin{array}{r|rrrr} & \downarrow & 3 & -21 & 36 \end{array}$$

$$\begin{array}{r|rrrr} 3 & 1 & -7 & 12 & 0 \end{array}$$

$$\begin{array}{r|rrrr} & \downarrow & 3 & -12 & \end{array}$$

$$\begin{array}{r|rrrr} & 1 & -4 & 0 & \end{array}$$

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