

3.1 Zeros of a Polynomial

Book Pages: 371-372

Objectives:

- I can find the zeroes of a polynomial using synthetic division and my calculator

~~- I can distinguish between zeros and factors~~

Identify the zeros of the following and explain what that means graphically.

factor form $\rightarrow f(x) = (x+2)(x-1)(x+3)$

FACTOR: something that divides evenly
* gives remainder 0

ZEROS: what makes each factor = 0, $x = \#$

graphically: where line touches x-axis (x-int)

zeros: $x = -2, 1, -3$

Write the function in standard form and state the relationship between the degree and zeros of the function

factor: $f(x) = (x+2)(x-1)(x+3)$

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

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

$$x^3 + 3x^2 + x^2 + 3x - 2x - 6$$

STANDARD FORM: $x^3 + 4x^2 + x - 6$

Degree = 3 = # of zeros

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Your Turn

Determine whether the given binomial is a factor of the polynomial $p(x)$. If it is, find the remaining factors of $p(x)$.

8. $p(x) = 2x^4 + 8x^3 + 2x + 8; (x + 4)$

$$\begin{array}{r} -4 \overline{) 2 \ 8 \ 0 \ 2 \ 8} \\ \underline{\downarrow -8 \ 0 \ 0 \ -8} \\ 2 \ 0 \ 0 \ 2 \ 0 \end{array}$$

yes, $x+4$ is a factor

9. $p(x) = 3x^3 - 2x + 5; (x - 1)$

$$\begin{array}{r} 1 \overline{) 3 \ 0 \ -2 \ 5} \\ \underline{\downarrow 3 \ 3 \ 1} \\ 3 \ 3 \ 1 \ 6 \end{array}$$

No $(x-1)$ is not a factor

factor \rightarrow Remainder 0

Not a factor \rightarrow Remainder $\neq 0$

Find the factors and zeros of the polynomial

$$f(x) = x^3 + 2x^2 - 19x - 20$$

factors: $(x+5)(x+1)(x-4)$

zeros: $x = -5, -1, 4$

Find the factors and zeros of the polynomial

$$x^3 - 2x^2 - 41x + 42$$

factors : $(x+6)(x-1)(x-7)$

zeros : $x = -6, 1, 7$

Find the factors and zeros of the polynomial

$$f(x) = x^4 - 4x^3 - 7x^2 + 22x + 24$$

$$\text{factors : } (x+2)(x+1)(x-3)(x-4)$$

$$\text{zeros : } x = -2, -1, 3, 4$$

Find the factors and zeros of the polynomial

$$f(x) = x^3 - 2x^2 - 8x$$

factors: $(x+2)(x-4)(x)$

zeros: $x = 0, -2, 4$

Find all the zeros of: $2x^4 - 7x^3 - 8x^2 + 14x + 8$

2^{nd} → Trace → ZERO

Left bound?

Right Bound?

Guess?

Find all the zeros of: $f(x) = x^3 + x^2 - 14x + 6$

