Bellwork Alg 2A Thursday, May 4, 2017

1. Use this polynomial: $f(x) = 2x^4 - 7x^3 - 14x - 8$

a. Make a list of all possible rational roots.

b. Find which of these possible rational roots is actually a root.

c. Use your answer to part b and find the remaining roots.

IRRATIONAL ROOT THEOREM If $a + \sqrt{b}$ is a root of a polynomial, then the conjugate $a - \sqrt{b}$ is also a root of the polynomial.

2. Use this polynomial: $f(x) = x^5 - 8x^4 + 6x^3 + 40x^2 - 16x - 48$

Given $6, -\sqrt{2}$, and $1 + \sqrt{5}$ are roots of this polynomial, find the remaining roots.

3. Use this polynomial: $f(x) = x^4 - 3x^3 - 13x^2 + 9x + 30$

Given -2 and $\sqrt{3}$ are a zeros of the polynomial find the remaining two zeros.

Bellwork Alg 2A Thursday, May 4, 2017 Answers

1. Use this polynomial: $f(x) = 2x^4 - 7x^3 - 14x - 8$

a. Make a list of all possible rational roots. $\frac{\pm 1, \pm 2, \pm 4, \pm 8}{\pm 1, \pm 2} = \boxed{\pm 1, \pm 2, \pm 4, \pm 8, \pm 1/2,}$

b. Find which of these possible rational roots is actually a root.

$f(1) = -27$ $f(2) = -60$ $\boxed{f(4) = 0 \quad 4 \text{ is a root}}$

$f(-1) = 15$ $f(-2) = 108$

c. Use your answer to part b and find the remaining roots.

$$\begin{array}{r|rrrrr} 4 & 2 & -7 & 0 & -14 & -8 \\ & & 8 & 4 & 16 & 8 \\ \hline & 2 & 1 & 4 & 2 & 0 \end{array}$$

$\rightarrow 2x^3 + x^2 + 4x + 2 \rightarrow$

	$2x$	$+1$
x^2	$2x^3$	$+x^2$
$+2$	$+4x$	$+2$

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

other zeros are $-\frac{1}{2}, \pm i\sqrt{2}$

IRRATIONAL ROOT THEOREM If $a + \sqrt{b}$ is a root of a polynomial, then the conjugate $a - \sqrt{b}$ is also a root of the polynomial.

2. Use this polynomial: $f(x) = x^5 - 8x^4 + 6x^3 + 40x^2 - 16x - 48$

Given $6, -\sqrt{2}$, and $1 + \sqrt{5}$ are roots of this polynomial, find the remaining roots.

$\boxed{+\sqrt{2} \ \& \ 1 - \sqrt{5}}$

THIS IS 3 roots so there must be 2 more

3. Use this polynomial: $f(x) = x^4 - 3x^3 - 13x^2 + 9x + 30$

Given -2 and $\sqrt{3}$ are a zeros of the polynomial find the remaining two zeros.

$$\begin{array}{r|rrrrr} -2 & 1 & -3 & -13 & 9 & 30 \\ & & -2 & 10 & 6 & -30 \\ \hline & 1 & -5 & -3 & 15 & 0 \end{array}$$

$\boxed{x^3 - 5x^2 - 3x + 15}$

If $\sqrt{3}$ is a root so is $-\sqrt{3}$. These two roots come from the factor $\boxed{x^2 - 3}$

$$\begin{array}{r} x - 5 \\ x^2 + 0x - 3 \overline{) \ x^3 - 5x^2 - 3x + 15} \\ -\ x^3 + 0x^2 - 3x \\ \hline -5x^2 + 0x + 15 \\ -\ -5x^2 + 0x + 15 \\ \hline \end{array}$$

THE OTHER 2 zeros are $5 \ \& \ -\sqrt{3}$