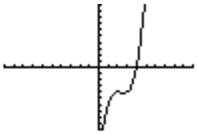
Algebra 2
145

Find all the zeros

1. $f(x) = x^3 - 7x^2 + 16x - 16$

Use a calculator to get started.



It looks like 4 is a possible zero, so we try it.

4	1	-7	16	-16
		4	-12	16
	1	-3	4	0

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

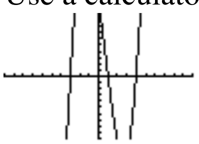
The second quantity cannot be factored, so we have to use the quadratic formula.

$$x = \frac{3 \pm \sqrt{9 - 4(1)(4)}}{2} = \frac{3 \pm \sqrt{9 - 16}}{2} = \frac{3 \pm \sqrt{-7}}{2} = \frac{3 \pm i\sqrt{7}}{2}$$

Therefore, zeros: $4, \frac{3 + i\sqrt{7}}{2}, \frac{3 - i\sqrt{7}}{2}$

2. $f(x) = x^3 - 2x^2 - 11x + 12$

Use a calculator to get started.



It looks like -3 & 1 & 4 are zeros, so we try them.

-3	1	-2	-11	12
		-3	15	-12
	1	-5	4	0

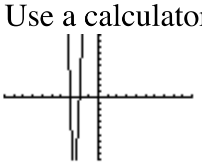
1	1	-5	4
		1	-4
	1	-4	0

$f(x) = (x + 3)(x^2 - 5x + 4)$ $\qquad f(x) = (x + 3)(x - 1)(x - 4)$

Therefore, zeros: -3, 1, 4

3. $f(x) = 5x^4 + 21x^3 + 14x^2 - 4x + 24$

Use a calculator to get started.



It looks like -3 & -2 are zeros, so we try them.

-3	5	21	14	-4	24
		-15	-18	12	-24
	5	6	-4	8	0

-2	5	6	-4	8
		-10	8	-8
	5	-4	4	0

$f(x) = (x + 3)(5x^3 + 6x^2 - 5x + 8)$ $\qquad f(x) = (x + 3)(x + 2)(5x^2 - 4x + 4)$

The last quantity cannot be factored, so we have to use the quadratic formula.

$$x = \frac{4 \pm \sqrt{16 - 4(5)4)}}{10} = \frac{4 \pm \sqrt{16 - 80}}{10} = \frac{4 \pm \sqrt{-64}}{10} = \frac{4 \pm 8i}{10} = \frac{2 \pm 4i}{5}$$

Therefore, zeros: $-3, -2, \frac{2 + 4i}{5}, \frac{2 - 4i}{5}$

Find a rational polynomial of minimum degree with the given zeros.

4. Zeros: 4, $5-2i$

We know that $5+2i$ is also a zero. Therefore we will multiply the indicated factors.

$(x-4)(x-[5-2i])(x-[5+2i]) = (x-4)([x-5]+2i)([x-5]-2i) = (x-4)(x^2-10x+25-4i^2)$
$= (x-4)(x^2-10x+25+4) = (x-4)(x^2-10x+29) = x^3-10x^2+29x-4x^2+40x-116$
$= \boxed{x^3-14x^2+69x-116}$

5. Zeros: 0, -3, 1, 4

We will multiply the indicated facros.

$x(x+3)(x-1)(x-4) = (x^2+3x)(x^2-4x-x+4) = (x^2+3x)(x^2-5x+4)$
$= x^4-5x^3+4x^2+3x^3-15x^2+12x = \boxed{x^4-2x^3+7x^2-11x+12x}$

6. Zeros: 3, $3+\sqrt{2}i$

We know that $3-\sqrt{2}i$ is also a zero. Therefore we will multiply the indicated factors.

$(x-3)(x-[3+\sqrt{2}i])(x-[3-\sqrt{2}i]) = (x-3)([x-3]-\sqrt{2}i)([x-3]+\sqrt{2}i)$
$= (x-3)(x^2-6x+9-2i^2) = (x-3)(x^2-6x+9+2) = (x-3)(x^2-6x+11)$
$= x^3-6x^2+11x-3x^2+18x-33 = \boxed{x^3-9x^2+29x-33}$

7. Expand: $(2x-3)^3$

Use Pascal's Triangle: The Three Line is 1 3 3 1

$(2x)^3+3(2x)^2(-3)+3(2x)(-3)^2+(-3)^3 = \boxed{8x^3-36x^2+54x-27}$

Algebra 2 Assignment 145 Wednesday December 9 2015 Hour Name

For #'s 1-4: Find all zeros.

1. $f(x) = x^3 - 8x^2 + 37x - 50$

2. $f(x) = x^3 - 7x^2 + 11x + 3$

3. $f(x) = x^5 + 3x^4 - 4x^3 - 2x^2 - 12x - 16$

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

For #'s 5-7: Write a rational polynomial of minimum degree with the following zeros.

5. $3,\ 4 - 2i$

6. 4, -2, 1

7. $-1,\ 2 - \sqrt{3}$

8. Expand $(3x - 4)^3$