

Finding Zeros of Polynomials

State the possible rational zeros for each function. Then find all zeros. One zero has been given.

1) $f(x) = 3x^4 + 5x^3 - 5x^2 - 5x + 2$; $-\frac{2}{3}$

2) $f(x) = 5x^4 + 41x^3 + 93x^2 + 67x + 10$; $-\frac{2}{5}$

3) $f(x) = 5x^4 - 27x^3 - 278x^2 - 81x + 45$; $-\frac{3}{5}$

4) $f(x) = 5x^3 - 21x^2 + 19x - 3$; $\frac{3}{5}$

$$5) f(x) = 6x^3 + 5x^2 - 17x - 6; \frac{3}{2}$$

$$6) f(x) = 3x^3 - 13x^2 + 13x - 3; 3$$

State the possible rational zeros for each function. Then find all zeros.

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

$$8) f(x) = 4x^3 + 4x^2 - x - 1$$

$$9) f(x) = 5x^3 - x^2 - 5x + 1$$

$$10) f(x) = 3x^3 + 13x^2 + 12x - 4$$

$$11) f(x) = 5x^3 + 3x^2 + 10x + 6$$

$$12) f(x) = 2x^3 + 5x^2 + 4x + 1$$

$$13) f(x) = 5x^4 - 3x^2 - 2$$

$$14) f(x) = 2x^3 + x^2 - 11x + 12$$

Answers to Finding Zeros of Polynomials (ID: 1)

1) Possible rational zeros: $\pm 1, \pm 2, \pm \frac{1}{3}, \pm \frac{2}{3}$
 2) Possible rational zeros: $\pm 1, \pm 2, \pm 3, \pm 5, \pm 10, \pm \frac{1}{5}, \pm \frac{2}{5}$

Zeros: $\left\{-1, \frac{1}{3}, 1, -2\right\}$

Zeros: $\left\{-\frac{1}{5}, -1, -5, -2\right\}$

3) Possible rational zeros:

$\pm 1, \pm 3, \pm 5, \pm 9, \pm 15, \pm 45, \pm \frac{1}{5}, \pm \frac{3}{5}, \pm \frac{9}{5}$

Zeros: $\left\{-5, \frac{11 + \sqrt{109}}{2}, \frac{11 - \sqrt{109}}{2}, -\frac{3}{5}\right\}$

4) Possible rational zeros: $\pm 1, \pm 3, \pm \frac{1}{5}, \pm \frac{3}{5}$

Zeros: $\left\{1, \frac{1}{5}, 3\right\}$

5) Possible rational zeros:

$\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{1}{6}$

Zeros: $\left\{-\frac{1}{3}, -2, \frac{3}{2}\right\}$

6) Possible rational zeros: $\pm 1, \pm 3$

Zeros: $\left\{1, \frac{1}{3}, 3\right\}$

Zeros: $\left\{1, -1, \frac{1}{3}\right\}$

8) Possible rational zeros: $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}$

Zeros: $\left\{\frac{1}{2}, -\frac{1}{2}, -1\right\}$

Zeros: $\left\{\frac{1}{5}, 1, -1\right\}$

10) Possible rational zeros:

$\pm 1, \pm 2, \pm 4, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}$

Zeros: $\left\{-2, \frac{-7 + \sqrt{73}}{6}, \frac{-7 - \sqrt{73}}{6}\right\}$

11) Possible rational zeros:

$\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{3}{5}, \pm \frac{6}{5}$

Zeros: $\left\{-\frac{3}{5}, i\sqrt{2}, -i\sqrt{2}\right\}$

12) Possible rational zeros: $\pm 1, \pm \frac{1}{2}$

Zeros: $\left\{-\frac{1}{2}, -1 \text{ mult. } 2\right\}$

13) Possible rational zeros: $\pm 1, \pm 2, \pm \frac{1}{5}, \pm \frac{2}{5}$

Zeros: $\left\{\frac{i\sqrt{10}}{5}, -\frac{i\sqrt{10}}{5}, 1, -1\right\}$

14) Possible rational zeros:

$\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{2}, \pm \frac{3}{2}$

Zeros: $\left\{-3, \frac{5 + i\sqrt{7}}{4}, \frac{5 - i\sqrt{7}}{4}\right\}$