

Polynomials Review

Evaluate each function at the given value.

1) $f(a) = 5a^3 + 15a^2 - 16a + 11$ at $a = -4$

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

State the possible number of positive, negative, and imaginary zeros for each function.

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

4) $f(x) = 5x^5 - 25x^4 + 22x^3 - 110x^2 + 8x - 40$

State the possible rational zeros for each function.

5) $f(x) = 2x^4 - x^2 - 28$

A) $0, \pm 1, \pm 2$

B) $\pm 1, \pm 7, \pm \frac{1}{2}, \pm \frac{7}{2}$

C) $\pm 1, \pm 2, \pm 4, \pm 7, \pm 14, \pm 28, \pm \frac{1}{2}, \pm \frac{7}{2}$

D) $\pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm \frac{1}{7}, \pm \frac{2}{7}, \pm \frac{1}{14}, \pm \frac{1}{28}$

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

A) $0, \pm 1, \pm 3$

B) $\pm 1, \pm \frac{1}{3}$

C) $\pm 1, \pm 7$

D) $\pm 1, \pm 3, \pm 9$

Find all roots.

7) $x^3 + 2x^2 - 4x - 8 = 0$

A) $\left\{-\frac{2}{3} \text{ mult. } 2, 2\right\}$

B) $\{-3 \text{ mult. } 2, 2\}$

C) $\left\{-2 \text{ mult. } 2, \frac{2}{3}\right\}$

D) $\{-2 \text{ mult. } 2, 2\}$

8) $x^3 + 3x^2 - 3x - 9 = 0$

A) $\{-3, \sqrt{3}, -\sqrt{3}\}$

B) $\left\{-3, \frac{\sqrt{6}}{2}, -\frac{\sqrt{6}}{2}\right\}$

C) $\{-3, i, -i\}$

D) $\{-3, i\sqrt{5}, -i\sqrt{5}\}$

9) $x^3 + 3x^2 + 5x + 15 = 0$

A) $\left\{-\frac{3}{2}, \frac{i\sqrt{15}}{3}, -\frac{i\sqrt{15}}{3}\right\}$

B) $\left\{-3, \frac{i\sqrt{15}}{3}, -\frac{i\sqrt{15}}{3}\right\}$

C) $\{-3, i\sqrt{5}, -i\sqrt{5}\}$

D) $\{-3, i\sqrt{7}, -i\sqrt{7}\}$

10) $x^3 - 1 = 0$

A) $\left\{\frac{1}{3}, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$

B) $\left\{1, \frac{-3 + \sqrt{5}}{2}, \frac{-3 - \sqrt{5}}{2}\right\}$

C) $\left\{1, \frac{-1 + i\sqrt{7}}{2}, \frac{-1 - i\sqrt{7}}{2}\right\}$

D) $\left\{1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$

Polynomials Review

Evaluate each function at the given value.

1) $f(a) = 5a^3 + 15a^2 - 16a + 11$ at $a = -4$
-5

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

State the possible number of positive, negative, and imaginary zeros for each function.

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

Possible # positive real zeros: 3 or 1
Possible # negative real zeros: 0

4) $f(x) = 5x^5 - 25x^4 + 22x^3 - 110x^2 + 8x - 40$

Possible # positive real zeros: 5, 3, or 1
Possible # negative real zeros: 0

State the possible rational zeros for each function.

5) $f(x) = 2x^4 - x^2 - 28$

A) $0, \pm 1, \pm 2$

B) $\pm 1, \pm 7, \pm \frac{1}{2}, \pm \frac{7}{2}$

*C) $\pm 1, \pm 2, \pm 4, \pm 7, \pm 14, \pm 28, \pm \frac{1}{2}, \pm \frac{7}{2}$

D) $\pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm \frac{1}{7}, \pm \frac{2}{7}, \pm \frac{1}{14}, \pm \frac{1}{28}$

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

A) $0, \pm 1, \pm 3$

*B) $\pm 1, \pm \frac{1}{3}$

C) $\pm 1, \pm 7$

D) $\pm 1, \pm 3, \pm 9$

Find all roots.

7) $x^3 + 2x^2 - 4x - 8 = 0$

A) $\left\{-\frac{2}{3} \text{ mult. } 2, 2\right\}$

B) $\{-3 \text{ mult. } 2, 2\}$

C) $\left\{-2 \text{ mult. } 2, \frac{2}{3}\right\}$

*D) $\{-2 \text{ mult. } 2, 2\}$

8) $x^3 + 3x^2 - 3x - 9 = 0$

*A) $\{-3, \sqrt{3}, -\sqrt{3}\}$

B) $\left\{-3, \frac{\sqrt{6}}{2}, -\frac{\sqrt{6}}{2}\right\}$

C) $\{-3, i, -i\}$

D) $\{-3, i\sqrt{5}, -i\sqrt{5}\}$

9) $x^3 + 3x^2 + 5x + 15 = 0$

A) $\left\{-\frac{3}{2}, \frac{i\sqrt{15}}{3}, -\frac{i\sqrt{15}}{3}\right\}$

B) $\left\{-3, \frac{i\sqrt{15}}{3}, -\frac{i\sqrt{15}}{3}\right\}$

*C) $\{-3, i\sqrt{5}, -i\sqrt{5}\}$

D) $\{-3, i\sqrt{7}, -i\sqrt{7}\}$

10) $x^3 - 1 = 0$

A) $\left\{\frac{1}{3}, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$

B) $\left\{1, \frac{-3 + \sqrt{5}}{2}, \frac{-3 - \sqrt{5}}{2}\right\}$

C) $\left\{1, \frac{-1 + i\sqrt{7}}{2}, \frac{-1 - i\sqrt{7}}{2}\right\}$

*D) $\left\{1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$