

Polynomial Review

Describe the end behavior of each function.

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

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

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

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

Factor each.

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

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

7) $f(x) = x^4 - 3x^3 + 3x^2 - 9x$

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

Factor each and find all zeros.

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

10) $f(x) = 2x^3 - x^2 - 6x$

11) $f(x) = 3x^3 + 4x^2 + 15x + 20$

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

13) $f(x) = 5x^3 - 25x^2 + 4x - 20$

14) $f(x) = 4x^3 - 20x^2 - 3x + 15$

Divide.

15) $(4m^3 + 28m^2 + 34m + 60) \div (m + 6)$

16) $(2n^3 - 20n^2 + 51n - 63) \div (n - 7)$

17) $(2n^4 - 19n^3 - n^2 + 9n) \div (2n - 1)$

18) $(4x^4 + 5x^3 + 19x^2 - 82x + 21) \div (4x - 7)$

Find all zeros. One zero has been given.

19) $f(x) = x^4 - 10x^3 + 32x^2 - 32x$; 2

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

21) $f(x) = x^4 - 4x^3 + 9x^2 - 10x$; 2

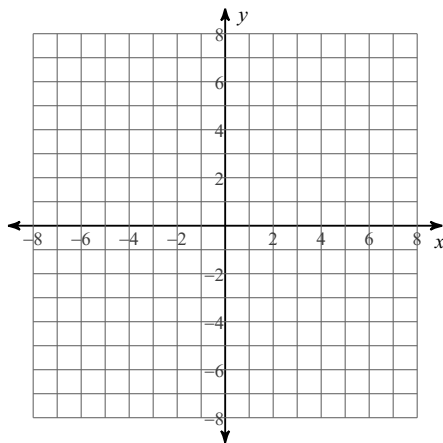
22) $f(x) = x^4 - 5x^2 + 4$; 2

23) $f(x) = x^4 - x^3 - 34x^2 - 20x$; -5

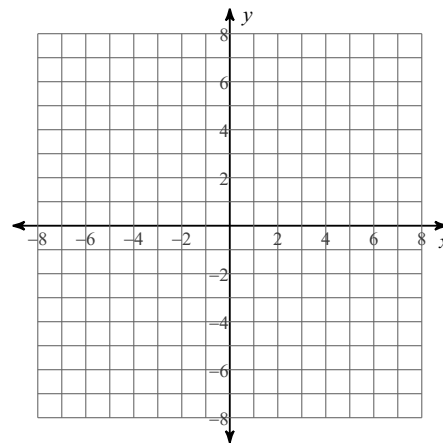
24) $f(x) = x^4 - 24x^2 - 40x$; -2

Sketch the graph of each polynomial. Consider y-intercept, x-intercepts (and multiplicity), and end behavior.

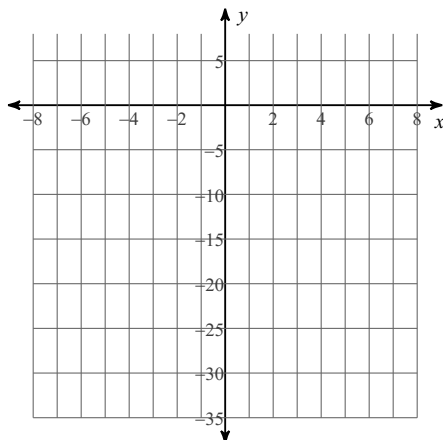
25) $y = x^3 - 3x^2 - x + 3$



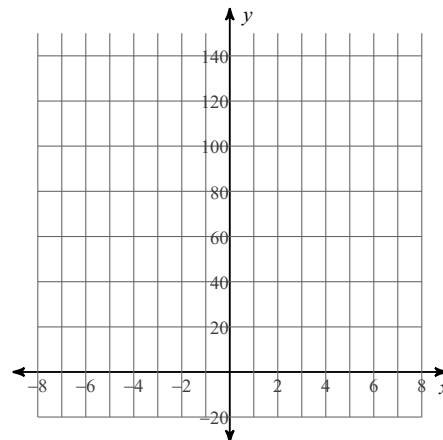
26) $y = -2x^4 - 8x^3 - 8x^2$



27) $y = x^3 + 3x^2 - 10x - 24$
Hint: One of the roots is -4



28) $y = -x^3 - 5x^2 + 25x + 125$



Polynomial Review

Describe the end behavior of each function.

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

Falls to the left. Falls to the right

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

Rises to the left. Rises to the right

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

Falls to the left. Rises to the right

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

Falls to the left. Falls to the right

Factor each.

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

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

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

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

7) $f(x) = x^4 - 3x^3 + 3x^2 - 9x$

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

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

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

Factor each and find all zeros.

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

Factors to: $f(x) = x(3x + 2)(x + 2)$

Zeros: $\left\{0, -\frac{2}{3}, -2\right\}$

10) $f(x) = 2x^3 - x^2 - 6x$

Factors to: $f(x) = x(2x + 3)(x - 2)$

Zeros: $\left\{0, -\frac{3}{2}, 2\right\}$

11) $f(x) = 3x^3 + 4x^2 + 15x + 20$

Factors to: $f(x) = (3x + 4)(x^2 + 5)$

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

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

Factors to: $f(x) = (2x + 1)(x^2 + 5)$

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

13) $f(x) = 5x^3 - 25x^2 + 4x - 20$

Factors to: $f(x) = (x - 5)(5x^2 + 4)$

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

14) $f(x) = 4x^3 - 20x^2 - 3x + 15$

Factors to: $f(x) = (x - 5)(4x^2 - 3)$

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

Divide.

15) $(4m^3 + 28m^2 + 34m + 60) \div (m + 6)$

$4m^2 + 4m + 10$

16) $(2n^3 - 20n^2 + 51n - 63) \div (n - 7)$

$2n^2 - 6n + 9$

17) $(2n^4 - 19n^3 - n^2 + 9n) \div (2n - 1)$

$n^3 - 9n^2 - 5n + 2 + \frac{2}{2n - 1}$

18) $(4x^4 + 5x^3 + 19x^2 - 82x + 21) \div (4x - 7)$

$x^3 + 3x^2 + 10x - 3$

Find all zeros. One zero has been given.

19) $f(x) = x^4 - 10x^3 + 32x^2 - 32x$; 2

$\{0, 4 \text{ mult. } 2, 2\}$

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

$\{0, 1 + i, 1 - i, -3\}$

21) $f(x) = x^4 - 4x^3 + 9x^2 - 10x$; 2

$\{0, 1 + 2i, 1 - 2i, 2\}$

22) $f(x) = x^4 - 5x^2 + 4$; 2

$\{-2, 1, -1, 2\}$

23) $f(x) = x^4 - x^3 - 34x^2 - 20x$; -5

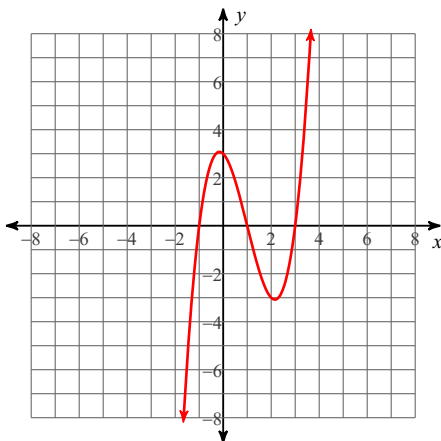
$\{0, 3 + \sqrt{13}, 3 - \sqrt{13}, -5\}$

24) $f(x) = x^4 - 24x^2 - 40x$; -2

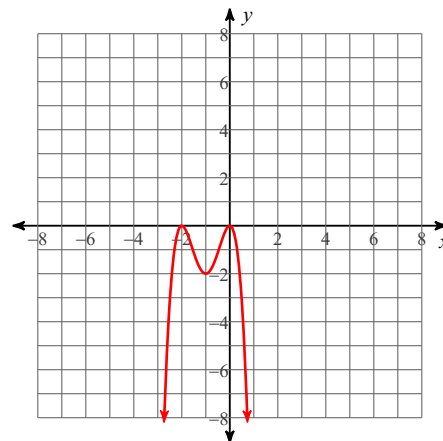
$\{0, 1 + \sqrt{21}, 1 - \sqrt{21}, -2\}$

Sketch the graph of each polynomial. Consider y-intercept, x-intercepts (and multiplicity), and end behavior.

25) $y = x^3 - 3x^2 - x + 3$

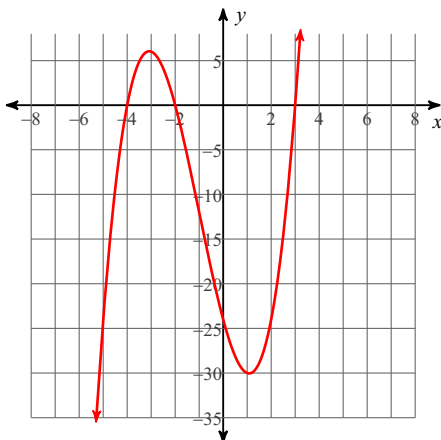


26) $y = -2x^4 - 8x^3 - 8x^2$



27) $y = x^3 + 3x^2 - 10x - 24$

Hint: One of the roots is -4



28) $y = -x^3 - 5x^2 + 25x + 125$

