

## Evaluating using synthetic substitution

Evaluate each function at the given value.

1)  $f(n) = n^4 + 6n^3 + 3n^2 + 24n + 40$  at  $n = -6$

$$\begin{array}{r|rrrrr} -6 & 1 & 6 & 3 & 24 & 40 \\ & \downarrow & -6 & 0 & -18 & -36 \\ \hline & 1 & 0 & 3 & 6 & \boxed{4} \end{array}$$

2)  $f(x) = 6x^3 + 18x^2 + 15x + 7$  at  $x = -2$

$$\begin{array}{r|rrrr} -2 & 6 & 18 & 15 & 7 \\ & \downarrow & -12 & -12 & -6 \\ \hline & 6 & 6 & 3 & \boxed{1} \end{array}$$

3)  $f(n) = n^3 + 6n^2 + 2n + 1$  at  $n = -6$

$$\begin{array}{r|rrrr} -6 & 1 & 6 & 2 & 1 \\ & \downarrow & -6 & 0 & -12 \\ \hline & 1 & 0 & 2 & \boxed{-11} \end{array}$$

4)  $f(m) = m^5 + 6m^4 - 4m^3 - 26m^2 - 17m - 41$  at  $m = -6$

$$\begin{array}{r|rrrrrr} -6 & 1 & 6 & -4 & -26 & -17 & -41 \\ & \downarrow & -6 & 0 & 24 & 12 & 30 \\ \hline & 1 & 0 & -4 & -2 & -5 & \boxed{-11} \end{array}$$

5)  $f(n) = n^4 - 33n^2 + 18n - 11$  at  $n = -6$

$$\begin{array}{r|rrrrr} -6 & 1 & 0 & -33 & 18 & -11 \\ & \downarrow & -6 & 36 & -18 & 0 \\ \hline & 1 & -6 & 3 & 0 & \boxed{-11} \end{array}$$

6)  $f(a) = -3a^3 + 4a^2 + 2a + 4$  at  $a = 2$

$$\begin{array}{r|rrrr} 2 & -3 & 4 & 2 & 4 \\ & \downarrow & -6 & -4 & -4 \\ \hline & -3 & -2 & -2 & \boxed{0} \end{array}$$

7)  $f(a) = a^3 + 2a^2 - 2a - 23$  at  $a = 2$

$$\begin{array}{r|rrrr} 2 & 1 & 2 & -2 & -23 \\ & \downarrow & & & \\ & 1 & 4 & 6 & -11 \end{array}$$

8)  $f(x) = x^2 + 8x + 5$  at  $x = -6$

$$\begin{array}{r|rrr} -6 & 1 & 8 & 5 \\ & \downarrow & & \\ & 1 & 2 & -7 \end{array}$$

9)  $f(m) = m^3 - 3m^2 - 21m + 24$  at  $m = 6$

$$\begin{array}{r|rrrr} 6 & 1 & -3 & -21 & 24 \\ & \downarrow & & & \\ & 1 & 3 & -3 & 6 \end{array}$$

10)  $f(a) = a^2 - 5a - 5$  at  $a = 6$

$$\begin{array}{r|rrr} 6 & 1 & -5 & -5 \\ & \downarrow & & \\ & 1 & 1 & 1 \end{array}$$

Name each polynomial by degree and number of terms.

11)  $10x + 1$

Degree: 1, Linear, Binomial

12)  $2n^2 - 6n - 6$

Degree: 2, Quadratic, Trinomial

13)  $-4x^3 + 6$

Degree: 3, Cubic, Binomial

14)  $k^5 - 9k^4 + 4k^3 - k^2 - 10k$

Degree: 5, Quintic, Polynomial

Describe the end behavior of each function.

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

$f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

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

$f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

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

$f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

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

$f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$

19)  $f(x) = 2x^2 + 8x + 4$

$f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

20)  $f(x) = x^3 - 11x^2 + 39x - 41$

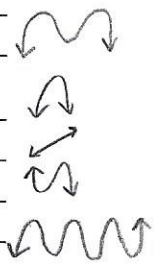
$f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

Algebra 2

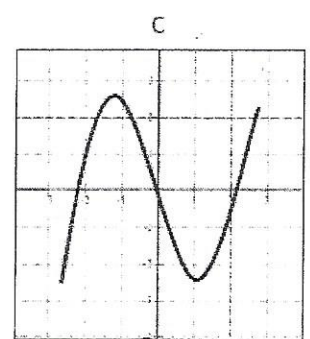
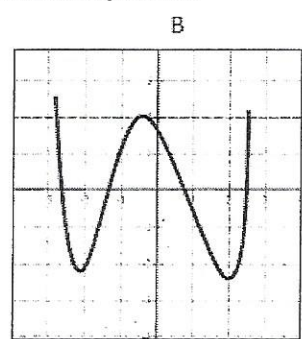
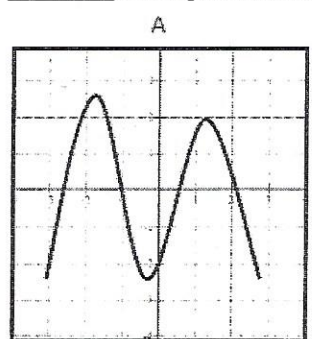
Complete the following table:

Polynomial Function	Type	Degree	Odd or even	Leading Coefficient	Number of Terms
1. $f(x) = -3x^4 - 3x + 8$	Quartic	4	Even	-3	3
2. $f(x) = 2 - 4x^2$	Quadratic	2	Even	-4	2
3. $f(x) = 3x - 1$	Linear	1	ODD	3	2
4. $f(x) = -3x + 4 - x^3 + x^2$	Cubic	3	ODD	-1	4
5. $f(x) = x^7 - 7$	Septic	7	ODD	1	2



Match the description of the polynomial function with its appropriate graph

- A 8. Degree is even, leading coefficient is negative.
- C 9. Degree is odd, leading coefficient is positive.
- B 10. Degree is even, leading coefficient is positive.



Tell whether the following is a polynomial function or not. If so, identify the leading coefficient and the degree.

1.  $f(x) = -3x^4 - 5x^2 + 8$  Yes. LC: -3 Degree: 4
2.  $f(x) = 4x^4 + 4x^2 - 3x + 1$  Yes. LC: 4 Degree: 4
3.  $f(x) = -3x + 4 - x^{-2} - 3x^3$  Not a function

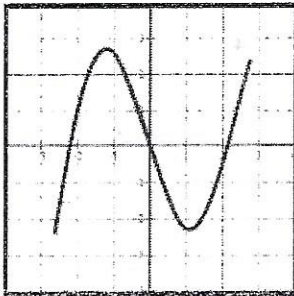
Match the description of the polynomial function with its appropriate graph.

B 8. Degree is odd, leading coefficient is negative.

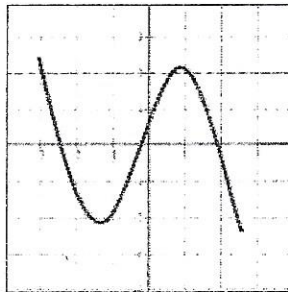
C 9. Degree is even, leading coefficient is positive.

A 10. Degree is odd, leading coefficient is positive.

A



B



C

