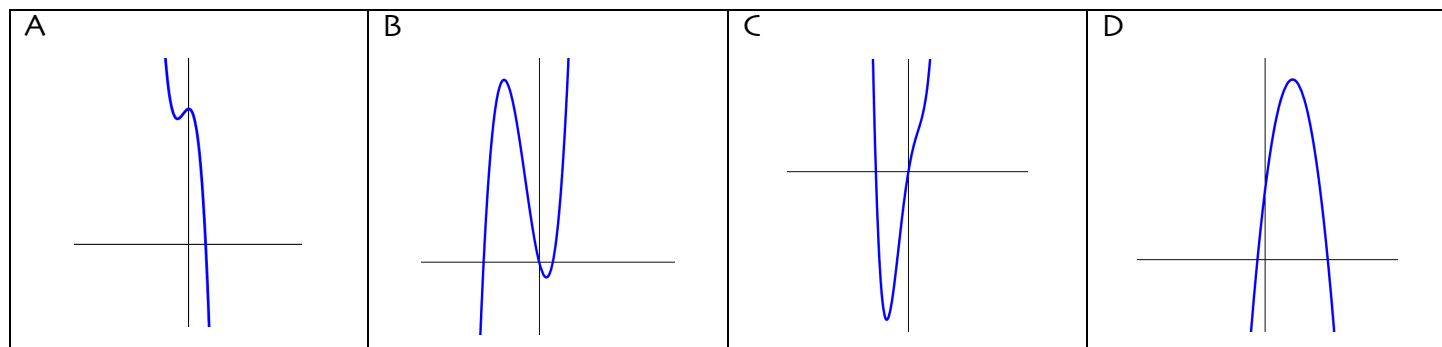


Sketching Polynomial Functions

State the degree, y-intercept and end behavior. Then match each polynomial to its graph.



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

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

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

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

For each polynomial:

- Find the real zeros. Determine whether the graph will cross or bounce at each zero.
- Find the y-intercept.
- State the degree and the max number of turning points.
- State the end behavior.
- Sketch the graph of the polynomial function. Plot extra points when necessary.

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

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

7. $y = -\frac{1}{5}x(x-4)^2$

8. $h(x) = x^4 - 2x^3 - 3x^2 + 2x + 2$

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

10. $g(x) = 6x^2 - 3x^3$

11. $f(x) = x^4 - 1$

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

Sketch a polynomial with the given characteristics. There are many possibilities.

- | | | |
|---|---|--|
| <p>13.</p> <ul style="list-style-type: none"> • positive y-intercept • two negative real zeros, one positive zero • $x \rightarrow -\infty, f(x) \rightarrow \infty$ • $x \rightarrow \infty, f(x) \rightarrow -\infty$ | <p>14.</p> <ul style="list-style-type: none"> • no real zeros • three turns • negative leading coefficient | <p>15.</p> <ul style="list-style-type: none"> • degree 6 • two bouncing positive real zeros • $x \rightarrow -\infty, f(x) \rightarrow \infty$ • $x \rightarrow \infty, f(x) \rightarrow \infty$ |
|---|---|--|

ANSWERS

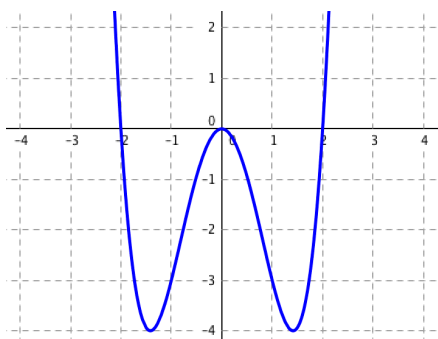
1. Degree: 3, $f(0) = 0$, $x \rightarrow -\infty, f(x) \rightarrow -\infty$, $x \rightarrow \infty, f(x) \rightarrow \infty$, B

2. Degree: 2, $f(0) = 5$, $x \rightarrow -\infty, f(x) \rightarrow -\infty$, $x \rightarrow \infty, f(x) \rightarrow -\infty$, D

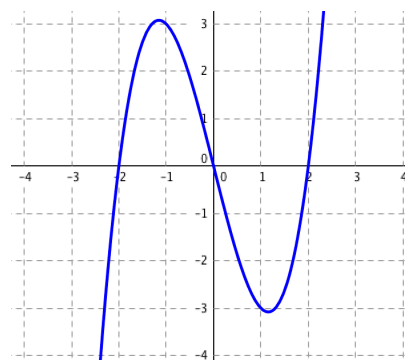
3. Degree: 4, $f(0) = 0$, $x \rightarrow -\infty, f(x) \rightarrow \infty$, $x \rightarrow \infty, f(x) \rightarrow \infty$, C

4. Degree: 3, $f(0) = 8$, $x \rightarrow -\infty, f(x) \rightarrow \infty$, $x \rightarrow \infty, f(x) \rightarrow -\infty$, A

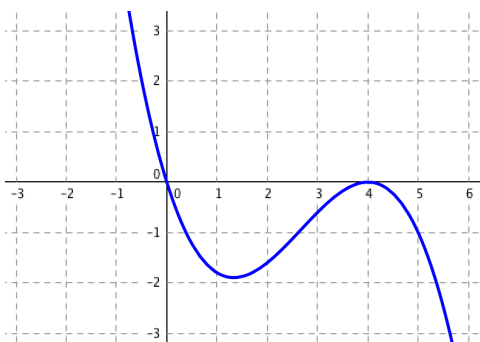
5.
 a. $x = -2$ (cross), 0 mult 2 (bounce), 2 (cross)
 b. $f(0) = 0$
 c. Degree = 4, At most 3 turns
 $x \rightarrow -\infty, f(x) \rightarrow \infty$
 d. $x \rightarrow \infty, f(x) \rightarrow \infty$



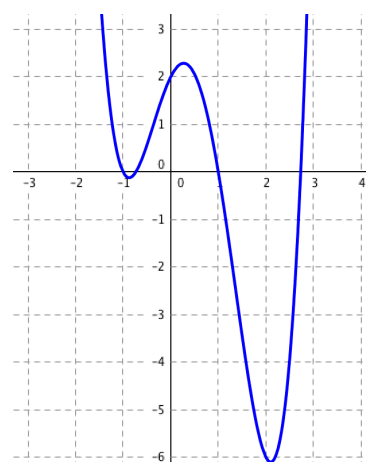
6.
 a. $x = -2$ (cross), 0 (cross), 2 (cross)
 b. $f(0) = 0$
 c. Degree: 3, At most 2 turns
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 d. $x \rightarrow \infty, f(x) \rightarrow \infty$



7.
 a. $x = 0$ (cross), 4 mult 2 (bounce)
 b. $f(0) = 0$
 c. Degree: 3, At most 2 turns
 $x \rightarrow -\infty, f(x) \rightarrow \infty$
 d. $x \rightarrow \infty, f(x) \rightarrow -\infty$

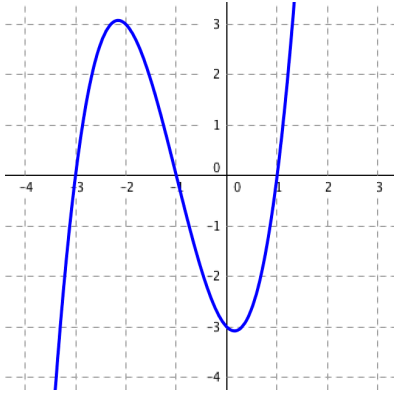


8.
 a. $x = -1$ (cross), 1 (cross), $1 + \sqrt{3}$ (cross), $1 - \sqrt{3}$ (cross)
 b. $f(0) = 2$
 c. Degree: 4, At most 3 turning points
 $x \rightarrow -\infty, f(x) \rightarrow \infty$
 d. $x \rightarrow \infty, f(x) \rightarrow \infty$



9.

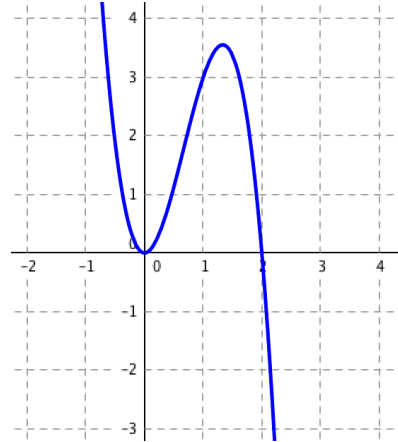
- a. $x = -3$ (cross), -1 (cross), 1 (cross)
- b. $f(0) = -3$
- c. Degree: 3, At most 2 turning points
- $x \rightarrow -\infty, f(x) \rightarrow -\infty$
- d. $x \rightarrow \infty, f(x) \rightarrow \infty$



10.

- a. $x = 0$ mult 2 (bounce), 2 (cross)
- b. $f(0) = 0$
- c. Degree: 3, At most 2 turning points
- $x \rightarrow -\infty, f(x) \rightarrow \infty$
- d. $x \rightarrow \infty, f(x) \rightarrow -\infty$

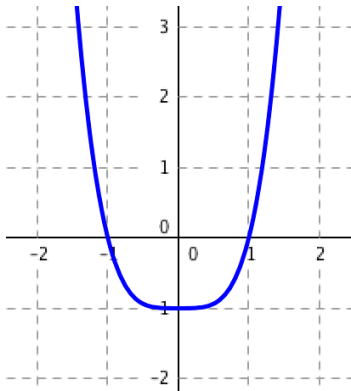
e.



11.

- a. $x = -1$ (cross), 1 (cross)
- b. $f(0) = -1$
- c. Degree: 4, At most 3 turning points
- $x \rightarrow -\infty, f(x) \rightarrow \infty$
- d. $x \rightarrow \infty, f(x) \rightarrow \infty$

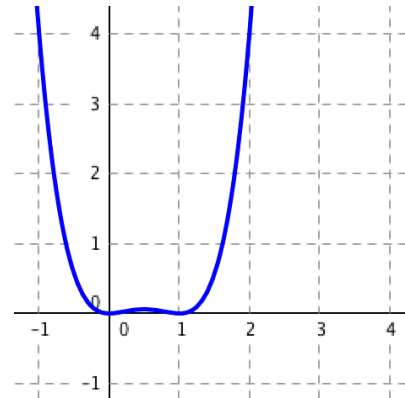
e.



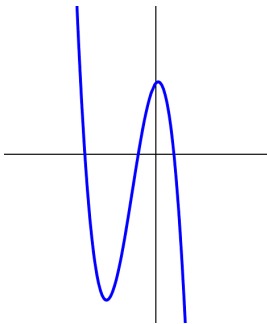
12.

- a. $x = 0$ mult 2 (bounce), 1 mult 2 (bounce)
- b. $f(0) = 0$
- c. Degree: 4, At most 3 turning points
- $x \rightarrow -\infty, f(x) \rightarrow \infty$
- d. $x \rightarrow \infty, f(x) \rightarrow \infty$

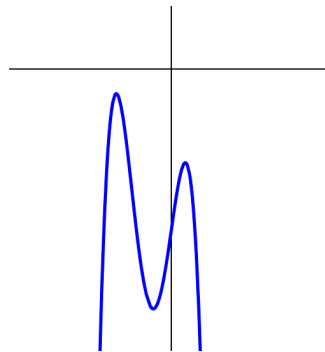
e.



13.



14.



15.

