

Polynomial Functions & their Graphs

[1] Complete the table

Name	Degree	Example	Shape	Possible number of turns	Possible number of real zeros
Constant					
Linear					
Quadratic					
Cubic					
Quartic					
Quintic					
n^{th} degree polynomial					

For each polynomial, determine the following

[a] how it behaves as $x \rightarrow \infty$; [b] how it behaves as $x \rightarrow -\infty$; [c] how many turns it could have; [d] the number of real zeros (x -intercepts) it could have; and [e] whether it is odd, even, or neither

[2] $f(x) = x^3 - x$

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

[3] $f(x) = x^2 - 3x^4$

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

[4] $f(x) = 5x^4 + 3$

[12] $f(x) = 2x + 5x^3 - 7x^5$

[5] $f(x) = x - x^3 - 4x^5$

[13] $f(x) = -3x^3 + 4x - 1$

[6] $f(x) = 4x^4 + 2x^2 - 5$

[14] $f(x) = 3x^3 - 4x + 1$

[7] $f(x) = x^5 - x^4 + x^3 - x^2 + x - 1$

[8] $f(x) = -x^5 + x^4 - x^3 + x^2 - x + 1$

[9] $f(x) = 1 - x^4 - 5x^8$

Find a polynomial function of the given degree with the given zeros.

[15] degree 3 with zeros $x = 3, x = \pm 4$

[16] degree 3 with zeros $x = -1, x = \pm 3i$

[17] degree 3 with zeros $x = 5$ (multiplicity 3)

[18] degree 3 with zeros $x = 3, x = 2 \pm 3i$

[19] degree 4 with zeros $x = \pm 2, x = -2 \pm 2i$

[20] degree 4 with zeros $x = 1 \pm i, x = -1 \pm i$

[21] degree 4 with zeros $x = -3$ (multiplicity 2), $x = 4 \pm 5i$

[22] degree 4 with zeros $x = 2 + i$ (multiplicity 2), $x = 2 - i$ (multiplicity 2)

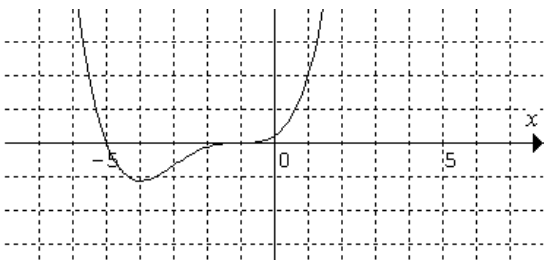
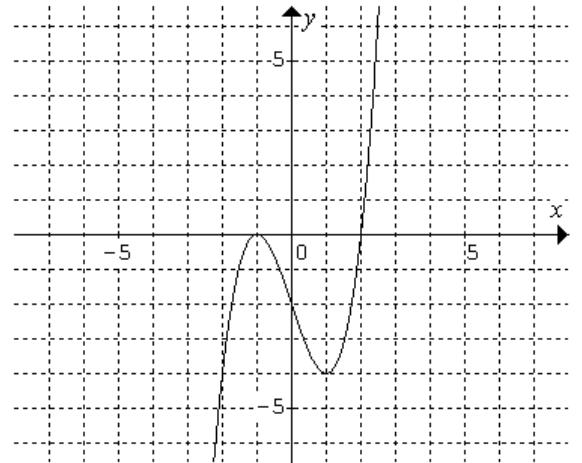
[23] degree 5 with zeros $x = -1$ (multiplicity 5)

[24] degree 4 with zeros $x = 2 \pm i, x = 1 \pm 2i$

[25] Write an equation for the cubic polynomial function whose graph is shown here. Note that the y -intercept is -2 .

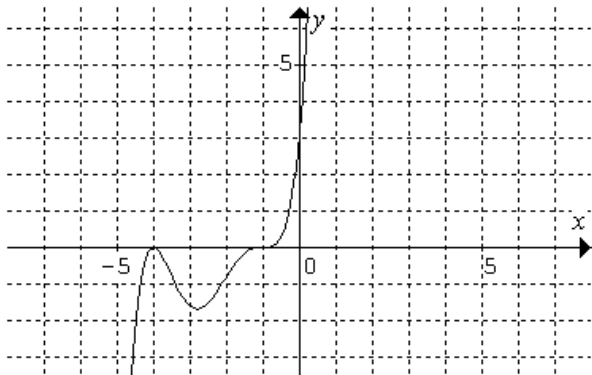
[26] Write an equation for the cubic polynomial with x -intercepts at $-3, 1,$ and 3 and y -intercept at 2 .

[27] Write an equation for the cubic polynomial with x -intercepts at $-1, 2,$ and 4 and y -intercept at 1 .



[28] Write an equation for the quartic polynomial function whose graph is shown here. Note that the graph passes through $(1, 2)$

[29] Write an equation for the quartic polynomial whose graph is tangent to the x -axis at -3 and 1 and has a y -intercept at 4 .



[30] Write an equation for the quintic polynomial function whose graph is shown here. The graph passes through $(1, 40)$

[31] Write an equation for the quartic polynomial whose graph is shown; it has a y-intercept at 3

