Extra Note - Max/Min/x-intercept

December 11, 2023 11:47 AM

$y = ax^3 + bx^2 + \dots + c$

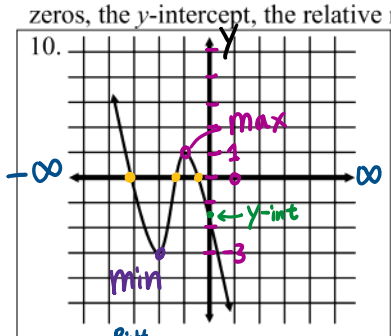
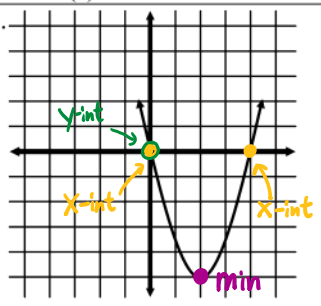
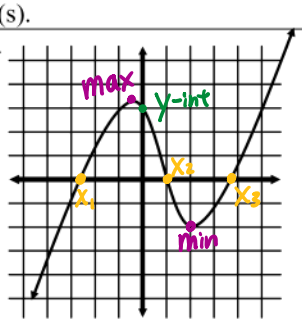
Polynomial Function Review and Min/Max, x-intercept Part 1

Polynomial functions have positive, integer exponents applied to variables. They do not include absolute values, roots, or negative exponents that are applied to variables, and they do not include variables in the denominator.

Classify the following functions. Decide if the function is a polynomial function. If it is a polynomial function, state its degree, type, leading coefficient and general shape.

1. $f(x) = 2x - \frac{2}{3}x^4 + 9$ Polynomial? ✓ Degree: ____ L.C.: ____ Type: ____	2. $f(x) = x + \pi$ Polynomial? ✓ Degree: ____ L.C.: ____ Type: ____	3. $f(x) = 3x^{-2} + 4x^{-1} + 1$ $\frac{3}{x^2}$ Polynomial? ✗ ~~Degree: ____ L.C.: ____~~ ~~Type: ____~~
4. $f(x) = x^2\sqrt{2} + x - 5$ + Deg 2 Polynomial? ✓ Degree: 2 L.C.: Q2→Q1 (End) Type: quadratic	5. $f(x) = \lvert x - 5 \rvert + 3$ Polynomial? ✗ Degree: ____ L.C.: ____ Type: ____	6. $f(x) = (x-5)^2 + 3$ + Deg 2 Polynomial? ✓ Degree: 2 L.C.: Q2→Q1 Type: Quad
7. $f(x) = -x^3 + 36x^2 - 3x + 7$ (−) Deg 3 +Deg 3 Polynomial? ✓ Degree: 3 L.C.: Q2→Q4 Type: Cubic	8. $f(x) = 25 - 2$ $y = 23$ 23 Polynomial? ✓ Degree: ø L.C.: Q2→Q1 Type: constant.	9. $f(x) = 2\sqrt{x} - 5$ Polynomial? ✗ Degree: ____ L.C.: ____ Type: ____

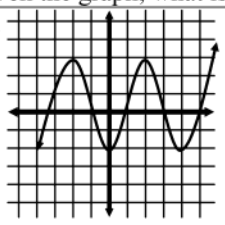
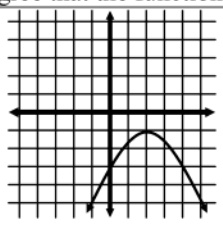
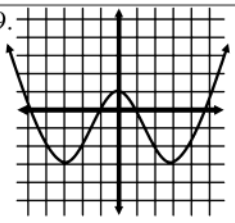
Given the graph, describe the end behavior of the function. Also, state the ordered pairs of the real zeros, the *y*-intercept, the relative maximum(s) and the relative minimum(s).

10.  As $x \to$ Right $+\infty$, $f(x) \to$ Q4 As $x \to$ Left $-\infty$, $f(x) \to$ Q2 Real Zeros: x-intercept x_1 x_2 x_3 *y*-intercept: $y = -1.5$ Relative maximum(s): $y = 1$ Relative Minimum(s): $y = -3$	11.  As $x \to +\infty$, $f(x) \to$ Q1 As $x \to -\infty$, $f(x) \to$ Q2 Real Zeros: $x_1 = \emptyset$ $x_2 = 4$ *y*-intercept: $y = \emptyset$ Relative maximum(s): None Relative Minimum(s): $y = -5$	12.  As $x \to +\infty$, $f(x) \to$ Q1 As $x \to -\infty$, $f(x) \to$ Q3 Real Zeros: $x_1 = -2.6$ $x_2 = 1$ $x_3 = 3.7$ *y*-intercept: $y = 3$ Relative maximum(s): $y = 3.2$ Relative Minimum(s): $y = -2$

Given the function, describe the end behavior.

13. $f(x) = -x^3 + 1$	14. $f(x) = x^5 + 2x^2$	15. $f(x) = 3x^8 - 4x^3$	16. $f(x) = -x^6 + 2x^3 - x$
As $x \to +\infty, f(x) \to$ ____	As $x \to +\infty, f(x) \to$ ____	As $x \to +\infty, f(x) \to$ ____	As $x \to +\infty, f(x) \to$ ____
As $x \to -\infty, f(x) \to$ ____	As $x \to -\infty, f(x) \to$ ____	As $x \to -\infty, f(x) \to$ ____	As $x \to -\infty, f(x) \to$ ____

Given the graph, what is the lowest degree that the function could have?

17. 	18. 	19. 
Number of turning points:____	Number of turning points:____	Number of turning points:____
Lowest Degree:_____	Lowest Degree:_____	Lowest Degree:_____
Real Zeros:_____	Real Zeros:_____	Real Zeros:_____
y-intercept:_____	y-intercept:_____	y-intercept:_____
Relative maximum(s):_____	Relative maximum(s):_____	Relative maximum(s):_____
Relative Minimum(s):_____	Relative Minimum(s):_____	Relative Minimum(s):_____
As $x \to +\infty, f(x) \to$ ____	As $x \to +\infty, f(x) \to$ ____	As $x \to +\infty, f(x) \to$ ____
As $x \to -\infty, f(x) \to$ ____	As $x \to -\infty, f(x) \to$ ____	As $x \to -\infty, f(x) \to$ ____

Graph the function. x^3

20. $f(x) = 5(x-1)(x-2)(x-3)$

Zoom: 6 Zstandard

max : y=1.92

min : y=-1.92

$x_1 = 1$

$x_2 = 2$

x-int Zeros: $x_3 = 3$

y-int: y=-30

Value X=∅ ➡

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

$y = 1.2 \times 10^{-12} \approx \emptyset$

max: y=4

min: y=∅

$x_1 = -2$

Zeros: $x_2 = 1$

y-int: y=2 (set x=0)

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

max: none

min : y=-4.19

Zeros: x_1, x_2

y-int:_____

23. $f(x) = 2(x+2)^2(x+4)^2$

Zeros:_____

y-int:_____