Handout for MATH 1300 (Barsamian) Lecture L13 Wed Sep 16: Symmetry (Section 1.7)

Test for Symmetries of Graphs of Equations

Possible Symmetry: The graph of the equation is symmetric with respect to the y axis.
Test: Replacing x with $-x$ in the equation results in an equivalent equation.

Possible Symmetry: The graph of the equation is symmetric with respect to the x axis.
Test: Replacing y with $-y$ in the equation results in an equivalent equation.

Possible Symmetry: The graph of the equation is symmetric with respect to the origin.
Test: Replacing x with $-x$ and y with $-y$ in the equation results in an equivalent equation.

Determine whether the graph of the equations have any of the above symmetries.

(a) $x^2 + y^2 = 3$

(b) $y = x^2 + 3$

(c) $x = y^2 + 3$

(d) $y = 2x^3 + 4x$

(e) $y = 2x + 4$

Definition of Even and Odd Functions

Words: f is an *even* function.

Meaning: $f(-x) = f(x)$ for all x in the domain.

Remark: The graph of an even function is symmetric with respect to the y axis.

Words: f is an *odd* function.

Meaning: $f(-x) = -f(x)$ for all x in the domain.

Remark: The graph of an even function is symmetric with respect to the origin.

Determine whether the functions are even or odd or neither.

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

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

(c) $f(x) = 4x^2 + 5$

(d) $f(x) = \sqrt{16 + x^2}$

(e) $f(x) = \frac{1}{1+x^2}$

(f) $f(x) = \frac{x}{1+x^2}$