Even and Odd Functions
Algebraically

A function is **even** if

All of the exponents of the variable are even.

A function is **odd** if

All of the exponents of the variable are odd.

A function is **neither** if

The exponents are a mixture of odd and even.
BEWARE OF CONSTANTS

All constants really have a $x^0$
$x^0$ is EVEN!!
Graphically

A function is **even** if

The graph reflects across the y-axis

*(means you can fold it hotdog style and it would match up).*

A function is **odd** if

The graph has 180° rotational symmetry about the ORIGIN

*(means you could turn it upside-down & it would still look the same...it must go through the origin).*
Ex. 1  Even, Odd or Neither?

Algebraically

$$f(x) = x^3 - x$$
Ex. 2  Even, Odd or Neither?

Algebraically

\[ f(x) = x^2 + 1 \]

Even
Ex. 3  Even, Odd or Neither?

Graphically

EVEN
Ex. 4  Even, Odd or Neither?

Graphically

Neither
Even, Odd or Neither?

\[ f(x) = 2x^4 - 3x^0 \]

Even

\[ f(x) = x^3 + x^1 \]

Odd
Even, Odd or Neither?

\[ f(x) = -x^3 \]  \quad Odd  \\

\[ f(x) = 5x^3 \]  \quad Odd  \\

\[ f(x) = x^2 + 4x^0 \]  \quad Even
Even, Odd or Neither?

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

\[ f(x) = -x^3 + 2x^1 \]

\[ f(x) = x^3 + 4x^1 + 1x^0 \]

Neither | Odd | Neither
Even, Odd or Neither?

EVEN  ODD
Even, Odd or Neither?

EVEN

Neither

ODD
If the dots shown are part of an even function, what points are also on the function?
If the dots shown are part of an odd function, what points are also on the function?