IN THIS STEP WE ANALYZE THE SYMMETRY OF YOUR GRAPH

==========

A GRAPH CAN DISPLAY VARIOUS KINDS OF SYMMETRY. THREE MAIN SYMMETRIES ARE ESPECIALLY IMPORTANT: EVEN, ODD, AND PERIODIC SYMMETRY.

- EVEN SYMMETRY. A FUNCTION IS EVEN IF ITS GRAPH IS SYMMETRIC BY REFLECTION OVER THE Y-AXIS.
- ODD SYMMETRY. A FUNCTION IS ODD IF ITS GRAPH IS SYMMETRIC BY 180 DEGREE ROTATION AROUND THE ORIGIN.
- PERIODICITY. A FUNCTION IS PERIODIC IF AN ONLY IF ITS VALUES REPEAT REGULARLY. THAT IS, IF THERE IS A VALUE P > 0 SUCH THAT F(X + P) = F(X) FOR ALL X IN ITS DOMAIN.

THE ALGEBRAIC TEST FOR EVEN/ODD IS TO PLUG IN (-X) INTO THE FUNCTION.

- IF F(-X) = F(X), THEN F IS EVEN.
- IF F(-X) = ¯F(X), THEN F IS ODD.

ON THE AP CALCULUS EXAMS, PERIODICITY OCCURS ONLY IN TRIGONOMETRIC FUNCTIONS.

Symmetry:

$$f(-x) = (-x)^3 - 6(-x)^2 + 9(-x) + 1$$

$$= -x^3 - 6x^2 - 9x + 1$$

$$f(-x) \neq f(x), \quad f(-x) \neq -f(x)$$

The function $y = f(x)$ is neither odd nor even.