Graph of Equations

1 Review

Assume...

P_1: (x_1, y_1)

P_2: (x_2, y_2)

1.1 Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \tag{1}$$

where:

d: Distance between P_1 and P_2

1.2 The Midpoint Formula

$$m = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}) \tag{2}$$

where:

m: Midpoint between P_1 and P_2

2 Equations of Circles

You can draw a circle using an **relationship** not a function.

$$(x - h)^2 + (y - k)^2 = r^2 \tag{3}$$

where:

(h, k): Center Point

r: Radius

3 Symmetry

3.1 Y-Axis

- Called an "**Even Function**"
- Looks the same after reflection over Y-Axis
- Has to meet the following requirement(s)...

$$f(x) = f(-x) \tag{4}$$

One example of such a function is $y = x^2$.

$$\begin{aligned} f(4) &= 16 \\ f(-4) &= 16 \\ 16 &= 16 \end{aligned}$$

3.2 X-Axis

- **Not a function**, doesn't pass vertical line test
- Called a **relationship**
- Has to meet the following requirement(s)...

$$x \mapsto \{-y, y\} \tag{5}$$

One example of such a equation is $x = y^2$ but **not** $y = \sqrt{x}$ because that would only allow positive x values.

$$9^2 = 81$$
$$(-9)^2 = 81$$

3.3 Origin

- Called an "**Odd Function**"
- Visually the same after 180° rotation about $(0, 0)$
- Has to meet the following requirement(s)...

$$f(x) = y \tag{6}$$
$$f(-x) = -y \tag{7}$$

One example of such a function is $y = x^3$

$$f(2) = 8$$
$$f(-2) = -8$$