Answer on Question #73846 – Math – Calculus

Question

Write the equation for the ellipse with foci at (5,-5) and (1,-5) and major axis of length 14?

Solution

The equation of the ellipse is

$$\frac{(x-x_0)^2}{a^2}+\frac{(y-y_0)^2}{b^2}=1$$

a, b – semi-major and semi-minor axes. a=14/2=7

x0, y0 – center of the ellipse

$$b=a\cdot\sqrt{1-\frac{c^2}{a^2}}=\sqrt{a^2-c^2}$$

c – focal distance (F1=(5,-5)=(x1,y1) and F2=(1,-5)=(x2,y2))

$$c=\frac{|F_1F_2|}{2}=\frac{\sqrt{(x2-x1)^2+(y2-y1)^2}}{2}=\frac{\sqrt{16+0}}{2}=2$$

$$\text{Then } b=\sqrt{49-4}=\sqrt{45}$$

$$x_0=\frac{x1+x2}{2}=\frac{6}{2}=3$$

$$y_0=\frac{y1+y2}{2}=\frac{-10}{2}=-5$$

and equation of the ellipse is

$$\frac{(x-3)^2}{49}+\frac{(y+5)^2}{45}=1$$

Answer: $\frac{(x-3)^2}{49}+\frac{(y+5)^2}{45}=1$