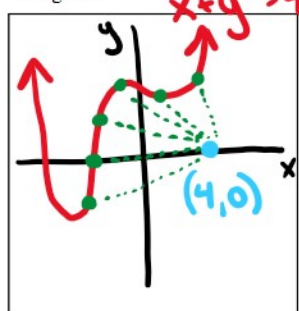


Distance Formula Notes

Wednesday, June 12, 2019 7:14 AM

Find the point on the graph of $x + y^2 = 4$ that is nearest to $(4, 0)$. Calculate the distance.

Diagram:



Equation A:
(given info)

$$x + y^2 = 4$$

Equation A:
(new version)

$$y = \sqrt{4 - x}$$

Equation B:
(max/min)

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

Equation B:
(new version)

$$D = (x^2 - 9x + 20)^{1/2}$$

Equation B:
(1st derivative)

$$D' = \frac{1}{2}(x^2 - 9x + 20)^{-1/2} \cdot (2x - 9) = 0$$

$$\frac{2x - 9}{2\sqrt{x^2 - 9x + 20}} = 0 \rightarrow 2x - 9 = 0 \rightarrow x = \frac{9}{2}$$

$$2\sqrt{x^2 - 9x + 20} = 0 \rightarrow 2\sqrt{x^2 - 9x + 20} = 0$$

$$(x - 4)(x - 5) = 0$$

x-coordinate: 4

y-coordinate: 0

Distance: 0

$$\boxed{x = 4}$$

$$\boxed{x = 5}$$

x	y	D
2 1/2		
4	0	
5		

$$y = \sqrt{4 - x}$$

$$y = \sqrt{4 - \frac{9}{2}} = \sqrt{-\frac{1}{2}} \quad \text{no}$$

$$y = \sqrt{4 - 4} = \sqrt{0} = 0$$

$$y = \sqrt{4 - 5} = \sqrt{-1} \quad \text{no}$$

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

$$D = \sqrt{(x - 4)^2 + (\sqrt{4 - x} - 0)^2}$$

$$(x - 4)^2$$

$$(x - 4)(x - 4)$$

$$x^2 - 4x - 4x + 16$$

$$D = \sqrt{x^2 - 8x + 16 + 4 - x}$$

$$D = (x^2 - 9x + 20)^{1/2}$$