Name_______________________________________FA Minimizing Distance from a point to a curve

1. Determine the coordinate that is closest to the point (6,0) that lies on the function $y = \sqrt{2x-4}$
2. Determine the minimum distance from the given point (6,0) to that function $y = \sqrt{2x-4}$

As always, it is an expectation that you clearly show the calculus and algebraic support for all answers

State the distance function related to this particular scenario

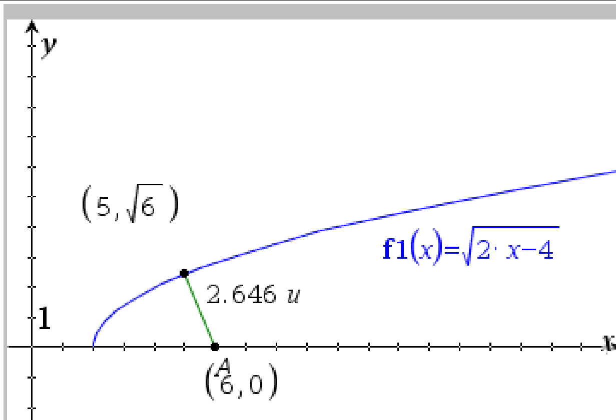
State the derivative of this particular distance function

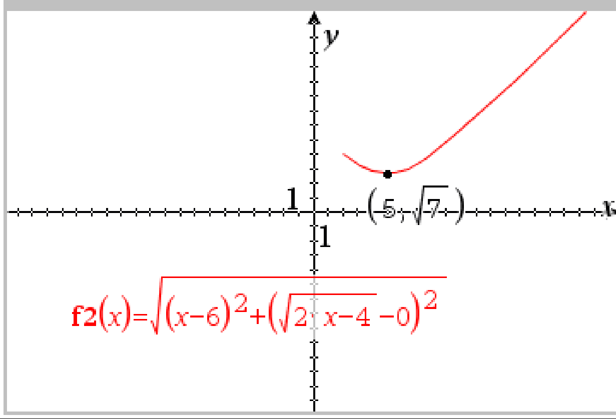
Determine the root(s) of this particular distance function

Determine the location of the point on the given function that will minimize the distance from the given point (6, 0)

Determine the minimum distance from the point (6, 0) and the function $y = \sqrt{2x-4}$

Sketch given function with given point on x axis Label the point that optimizes the distance to the given point	Sketch the given distance model Label the minimum coordinate on this function





$D(x)= \sqrt{(x-6)^2+(\sqrt{2\cdot x-4}-0)^2}$

$D(x) = \sqrt{x^2-10\cdot x+32}$

$D'(x) = \dfrac{x-5}{\sqrt{x^2-10\cdot x+32}}$

D'(x) will have a minimum at x = 5

So the point closest to the function is

$(5, \sqrt{6}) = (5, \sqrt{6}) \approx (5, 2.449)$

The minimum distance is

$D(5) = \sqrt{7} \approx 2.646$

Name_____________________________________FA Minimizing Distance from a point to a curve

1. Determine the coordinate that is closest to the point (9,0) that lies on the function $y=\sqrt{5x-20}$
2. Determine the minimum distance from the given point (9,0) to that function $y=\sqrt{5x-20}$

As always, it is an expectation that you clearly show the calculus and algebraic support for all answers

State the distance function related to this particular scenario

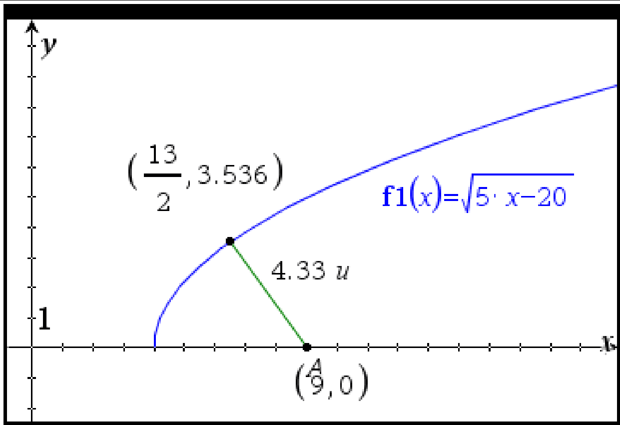
State the derivative of this particular distance function

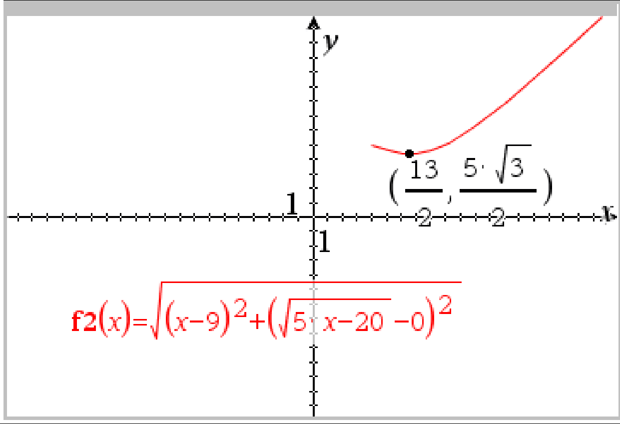
Determine the root(s) of this particular distance function

Determine the location of the point on the given function that will minimize the distance from the given point (9, 0)

Determine the minimum distance from the point (9, 0) and the function $y=\sqrt{5x-20}$

Sketch given function with given point on x axis Label the point that optimizes the distance to the given point	Sketch the given distance model Label the minimum coordinate on this function





$D(x)=\sqrt{(x-9)^2+\left(\sqrt{5\cdot x-20}-0\right)^2}$

$D(x)=\sqrt{x^2-13\cdot x+61}$

$D'(x)=\dfrac{2\cdot x-13}{2\cdot\sqrt{x^2-13\cdot x+61}}$

D'(x) will have a minimum at $x=\dfrac{13}{2}$

So the point closest to the function is

$\left(\dfrac{13}{2},\ \dfrac{5\cdot\sqrt{2}}{2}\right)\approx\left(\dfrac{13}{2},\ 3.536\right)$

The minimum distance is

$D\left(\dfrac{13}{2}\right)=\dfrac{5\cdot\sqrt{3}}{2}\approx 4.33$

Name_____________________________________FA Minimizing Distance from a point to a curve

1. Determine the coordinate that is closest to the point (12,0) that lies on the function $y=\sqrt{6x-18}$
2. Determine the minimum distance from the given point (12,0) to that function $y=\sqrt{6x-18}$

As always, it is an expectation that you clearly show the calculus and algebraic support for all answers

State the distance function related to this particular scenario

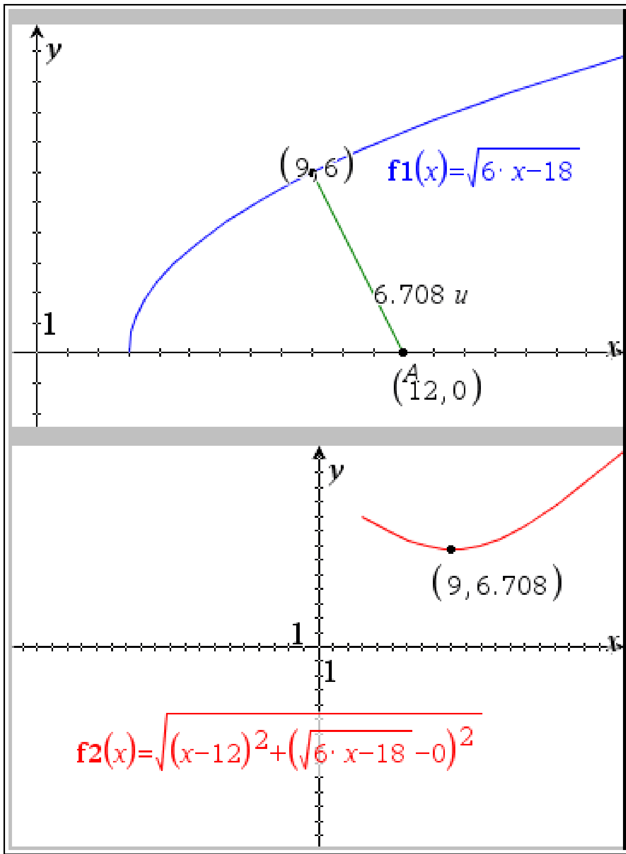
State the derivative of this particular distance function

Determine the root(s) of this particular distance function

Determine the location of the point on the given function that will minimize the distance from the given point (12, 0)

Determine the minimum distance from the point (12, 0) and the function $y=\sqrt{6x-18}$

Sketch given function with given point on x axis Label the point that optimizes the distance to the given point	Sketch the given distance model Label the minimum coordinate on this function



$D(x)=\sqrt{(x-12)^2+\left(\sqrt{6\cdot x-18}-0\right)^2}$

$D(x)=\sqrt{x^2-18\cdot x+126}$

$D'(x)=\dfrac{x-9}{\sqrt{x^2-18\cdot x+126}}$

D'(x) will have a minimum at x = 9

So the point closest to the function is

$(9,\ 6)=(9,\ 6)\approx(9,\ 6.)$

The minimum distance is

$D(9)=3\cdot\sqrt{5}\approx 6.708$

Name_____________________________________FA Minimizing Distance from a point to a curve

1. Determine the coordinate that is closest to the point (11,0) that lies on the function $y=\sqrt{8x-32}$
2. Determine the minimum distance from the given point (11,0) to that function $y=\sqrt{8x-32}$

As always, it is an expectation that you clearly show the calculus and algebraic support for all answers

State the distance function related to this particular scenario

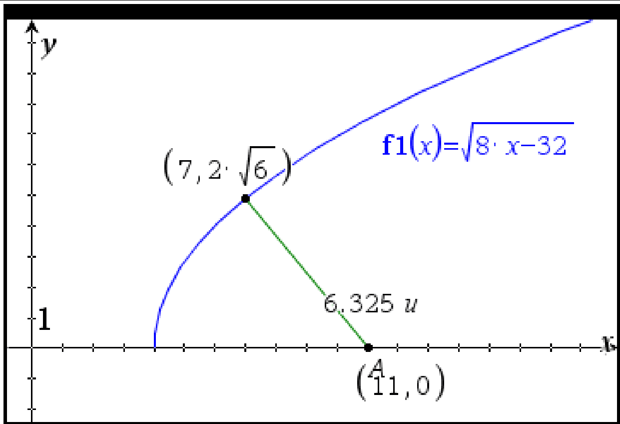
State the derivative of this particular distance function

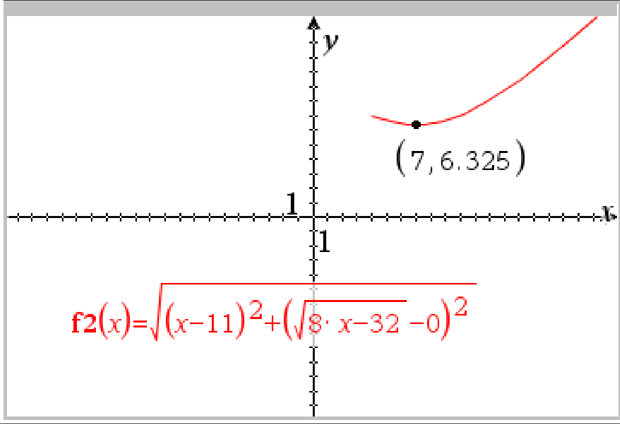
Determine the root(s) of this particular distance function

Determine the location of the point on the given function that will minimize the distance from the given point (11, 0)

Determine the minimum distance from the point (11, 0) and the function $y=\sqrt{8x-32}$

Sketch given function with given point on x axis Label the point that optimizes the distance to the given point	Sketch the given distance model Label the minimum coordinate on this function





$D(x) = \sqrt{(x-11)^2+\left(\sqrt{8\cdot x-32}-0\right)^2}$

$D(x) = \sqrt{x^2-14\cdot x+89}$

$D'(x) = \dfrac{x-7}{\sqrt{x^2-14\cdot x+89}}$

D'(x) will have a minimum at x = 7

So the point closest to the function is

$(7,\ 2\cdot\sqrt{6}) \approx (7,\ 4.899)$

The minimum distance is

$D(7) = 2\cdot\sqrt{10} \approx 6.325$