Name_____

Optimization problems: Distance between a curve and number properties optimization problems

1. The sum of two positive numbers is 2. Find the smallest value possible for the sum of the cube of one number and the square of the other.

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

One number _____ the other number _____

https://www.mathalino.com/reviewer/05-08-number-problems-in-maxima-and-minima

2. Find two numbers whose sum is a, if the product of one to the square of the other is to be a minimum.

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

One number _____ the other number _____

https://www.mathalino.com/reviewer/05-08-number-problems-in-maxima-and-minima

3. Find two numbers whose sum is a, if the product of one by the cube of the other is to be a maximum.

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

One number _____ the other number _____

https://www.mathalino.com/reviewer/05-08-number-problems-in-maxima-and-minima

4. Find two numbers whose sum is a, if the product of the square of one by the cube of the other is to be a maximum.

State given variables define one in terms of the other, state any constraints of the numbers

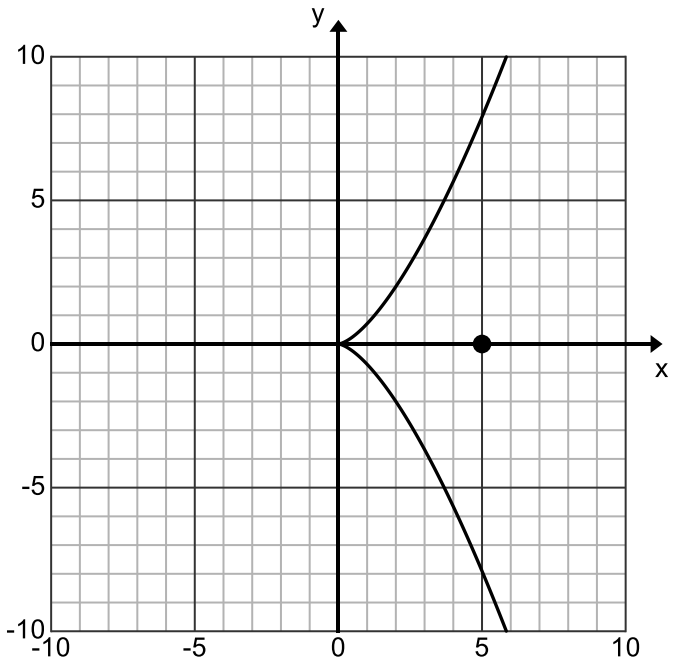
State function to be optimized

Show first derivative of optimization function

One number _____ the other number _____

https://www.mathalino.com/reviewer/05-08-number-problems-in-maxima-and-minima

5. Find the shortest distance from the point $(5, 0)$ to the curve $2y^2 = x^3$.



State given variables define one in terms of the other, state any constraints of the numbers

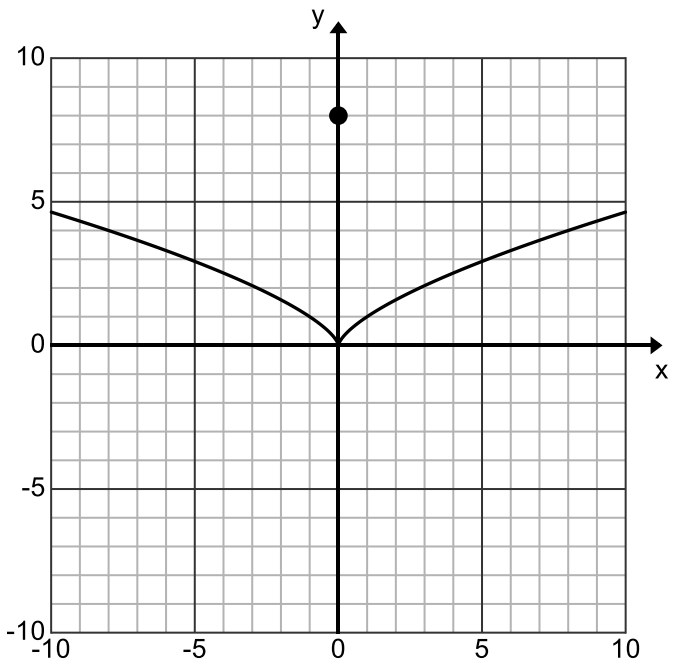
State function to be optimized

Show first derivative of optimization function

Exact distance _____approximate distance _____

https://www.mathalino.com/reviewer/differential-calculus/48-49-shortest-distance-from-a-point-to-a-curve-by-maxima-and-minima

6. Find the shortest distance from the point (0,8) to the curve $x^2 = y^3$



State given variables define one in terms of the other, state any constraints of the numbers

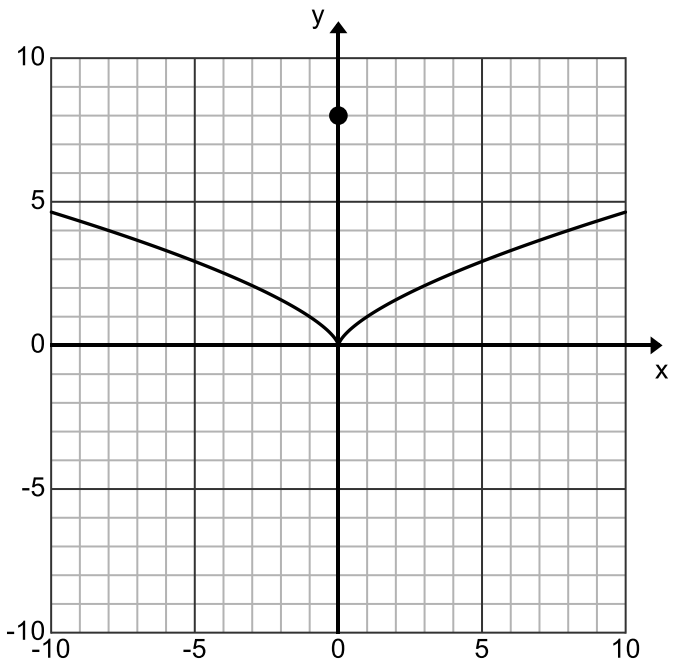
State function to be optimized

Show first derivative of optimization function

Exact distance _____approximate distance _____

https://www.mathalino.com/reviewer/differential-calculus/48-49-shortest-distance-from-a-point-to-a-curve-by-maxima-and-minima

7. Find the shortest distance from the point (0,8) to the curve $x^2 = y^3$



State given variables define one in terms of the other, state any constraints of the numbers

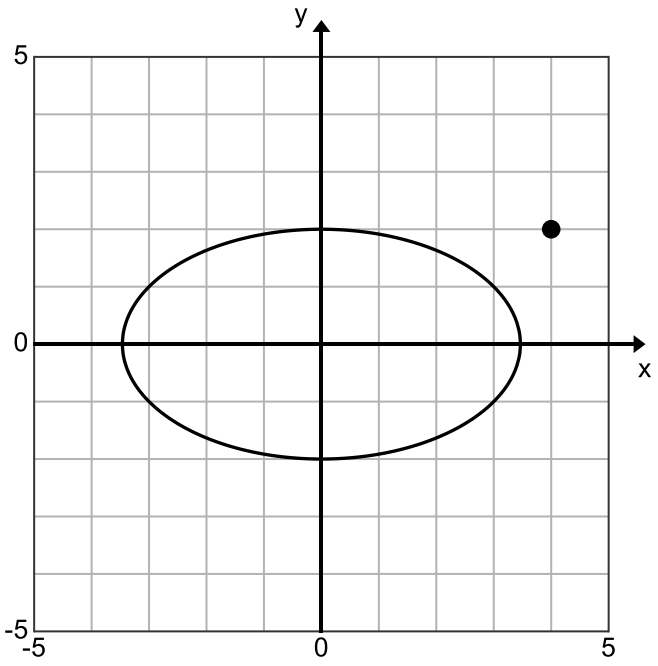
State function to be optimized

Show first derivative of optimization function

Exact distance _____approximate distance _____
Similar problem answer not the answer

https://www.mathalino.com/reviewer/differential-calculus/48-49-shortest-distance-from-a-point-to-a-curve-by-maxima-and-minima

8. Find the shortest distance from the point $(4, 2)$ to the ellipse $x^2 + 3y^2 = 12$.



State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

Exact distance _____approximate distance _____

https://www.mathalino.com/reviewer/differential-calculus/50-52-nearest-distance-from-a-given-point-to-a-given-curve

9. A man on an island 12 miles south of a straight beach wishes to reach a point on shore 20 miles east. If a motorboat, making 20 miles per hour, can be hired at the rate of $2.00 per hour for the time it is actually used, and the cost of land transportation is $0.06 per mile, how much must he pay for the trip?

Draw the related problem

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

approximate cost _____

https://www.mathalino.com/reviewer/differential-calculus/69-71-shortest-and-most-economical-path-of-motorboat

10. A man in a motorboat at A (Figure 42) receives a message at noon calling him to B. A bus making 40 miles per hour leaves C, bound for B, at 1:00 PM. If AC = 40 miles, what must be the speed of the boat to enable the man to catch the bus.

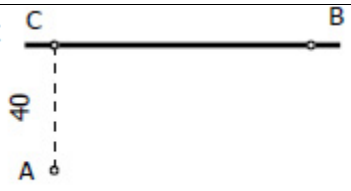


Figure 42

Draw the related problem

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

Exact speed _____approximate speed _____

https://www.mathalino.com/reviewer/differential-calculus/69-71-shortest-and-most-economical-path-of-motorboat

11. A man in a motorboat at A (Figure 42) receives a message at noon calling him to B. A bus making 40 miles per hour leaves C, bound for B, at 1:00 PM. If AC = 40 miles, what must be the speed of the boat to enable the man to catch the bus.

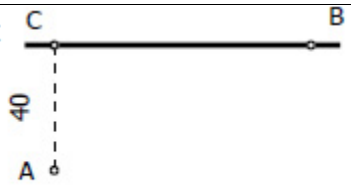


Figure 42

Draw the related problem

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

Exact speed _____approximate speed _____

https://www.mathalino.com/reviewer/differential-calculus/69-71-shortest-and-most-economical-path-of-motorboat

12. In Problem **11** if the speed of the boat is 30 miles per hour, what is the greatest distance offshore from which the bus can be caught?

Draw the related problem

State given variables define one in terms of the other, state any constraints of the numbers

State function to be optimized

Show first derivative of optimization function

Exact speed _____approximate speed _____

https://www.mathalino.com/reviewer/differential-calculus/69-71-shortest-and-most-economical-path-of-motorboat