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QUESTION 1

Drag and Drop in the blank provided the correct answer.

Consider the two functions

$f(x) = \sqrt{x+1}$

and

$g(x) = ln(x)$

.

Given

$A(2,1.7321); B(3,2); C(4,2.2361); D(5,2.4495); E(2,0.6931); F(3,1.0986); G(4,1.3863);$ and $H(5,$

Divide each curve into 3 segments and estimate the arc length to the nearest hundredth for

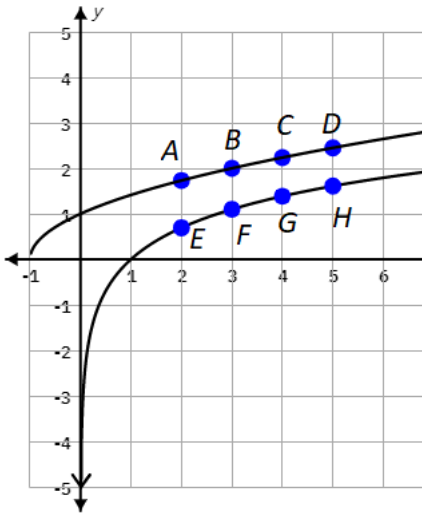
$2 \leq x \leq 5$

.

The measure of their estimated arc lengths differs by

$\approx$

0.06 ✓



0.35 0.16 0.01

QUESTION 2

Fill the correct answer in the blank provided.

Estimate the slope of

$f(x) = e^x$

at

$x = 0$

.

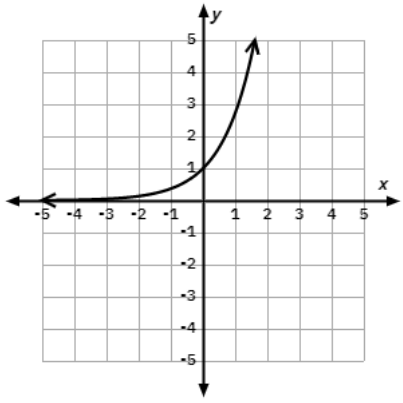
The slope of

$f(x) = e^x$

at

$x = 0$

is around 1 ✓ .



QUESTION 3

Drag and Drop in the blank provided the correct answer.

Approximate the arc length of the curve

$f(x) = x^3 + 3$

on the interval

$-1 \le x \le 1$

using the given segments.

Number of segments	Points used
1: AE	$A(-1,2)$ $E(1,4)$
2: $AC + CE$	$A(-1,2)$ $C(0,3)$ $E(1,4)$
3: $AB + BC + CE$	$A(-1,2)$ $B(-0.5,2.875)$ C
4: $AB + BC + CD + DE$	$A(-1,2)$ $B(-0.5,2.875)$ C $D(0.5, 3.125)$ $E(1,4)$

$-\sqrt{0.265625}$ -3.0463 $-\sqrt{1.015625}$ 4.0423 $\sqrt{0.365627}$

QUESTION 4

Select the correct answer from the drop-down menu.

Consider the function

$f(x) = \log_2(x+1);\ x > -1$

and the points

$A(0,0),\ B(3,2),$

and

$C(1,1)$

.

Is the tangent to the graph of

f

at

C

parallel to the line

(AB)

?

The slope of the line

(AB)

is 0.67 ✓, and the slope of the curve of

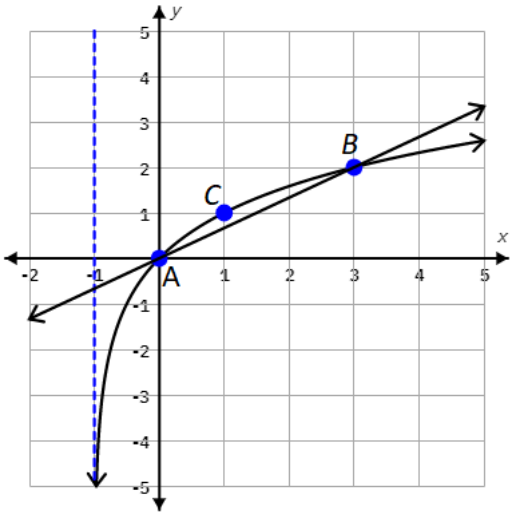
f

at

C

is around 0.72 ✓.

Since they have different ✓ slopes, they are not parallel ✓.



QUESTION 5

Select the correct answer from the drop-down menus.

To estimate the slope of a curve at the point (a,b):

1) Find the slope of the secants formed by (a,b) and the ordered pairs to the left of (a,b).

2) Find the slope of the secants ✓ formed by (a,b) and the ordered pairs to the right of (a,b).

3) As the points to the left and to the right get closer ✓ to (a,b) estimate the value to which the slope of the secant ✓ gets close.

QUESTION 6

Select the correct answer from the drop-down menus.

To estimate the arc length of a curve between two given points, we divide the curve into [segments] and apply the [distance] formula to find the length of each segment. Then, we add the distances to find the estimated arc length of the curve.

The more the number of segments the curve is divided to, the [closer] the estimation is to the actual measure.

QUESTION 7

Fill the correct answer in the blank provided. Round your answer to the nearest hundredth.

An arch is a part of the function

$f(x) = -(x-2)^2 + 4$ where $0 \le x \le 4$

.

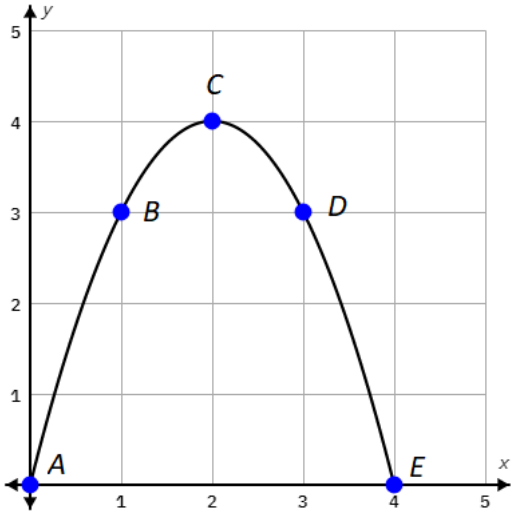
The exact length of this arch is

$9.29\ m$

.

By dividing its curve into 2 segments, its estimated length is approximately less than the exact length by [35] *cm*, and into 4 segments by [14] *cm*.

33 50 94 29



QUESTION 8

Select the correct answer from the drop-down menus.

Approximate the slope of

$f(x) = x^2$

at

$x = 2$

.

Find the slopes of the secants formed by (2,4) and points to the left and to the right of (2,4).

Points to the left of (2,4)	The slope of the secant	Points to the right of (2,4)	The slope of the secan

(1.5, 2.25)	$m_{sec} =$ 3.5 ✓	(2.5, 6.25)	$m_{sec} =$ 4.5
(1.09, 1.1881)	$m_{sec} =$ 3.09 ✓	(2.1,4.41)	$m_{sec} =$ 4.1
(1.99,3.9601)	$m_{sec} =$ 3.99 ✓	(2.01,4.0401)	$m_{sec} =$ 4.01

As the points on the graph approach (2,4), from the left and right, the slope of the secant approaches 4 ✓ .

5 4.7 3.789 4.001

QUESTION 9

Fill the correct answer in the blank provided.

Estimate the length of the curve

$f(x) = x^2 + 1$

on the interval

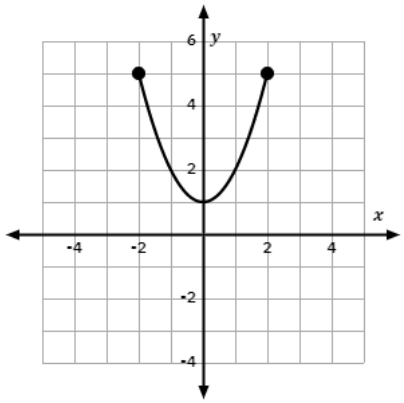
$-2 \leq x \leq 2$

by dividing the curve into four segments.
Choose the points: (-2,5) (-1,2) (0,1) (1,2) and (2,5) on the graph.
Rounded to the nearest hundredth, the arc length of this curve for

$-2 \leq x \leq 2$

is about 9.15 ✓ .

-



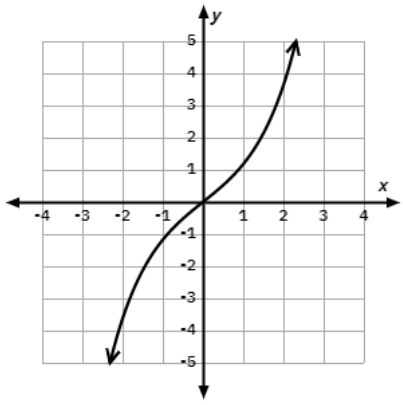
QUESTION 10

Select the correct answer from the drop-down menu.

The slope of the function

$f(x) = \sinh(x)$ at $x = 0$

is around 1 .



QUESTION 11

Fill your answer in the blank provided. Round your answer to the nearest hundredth.

Two cities

A

and

D

are linked by two roads.

Road1 is represented by part of the function

$f(x) = x^2 - 3x$

, and Road2 is represented by part of the function

$g(x) = -x^2 + 2x$

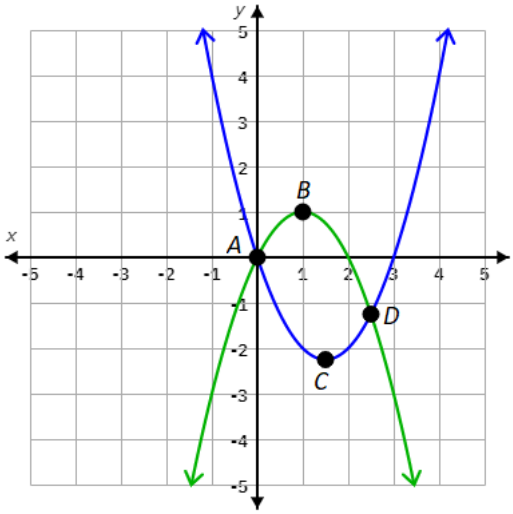
where the distance is **in hundreds of kilometers**

(Km)

. Given the points:

$A(0,0);\ B(1,1);\ C(1.5,-2.25);$ and $D(2.5,-1.25)$

.



By dividing each curve into 2 segments, the estimated distance by taking any road is 412

km

.

QUESTION 12

Choose the correct statement. Select all that apply.

Samer and Salem want to find the slope of a curve at a given point.

Samer said that to find the slope of a curve at a given point, we need to divide the curve into many segments and find the length of each segment, using the distance formula, and after that add up the distances to get the slope of the curve at a point. However, Salem said that we need to choose points to the left and the right of the given point, find the slopes of the secants, and then estimate the slope of the curve at the given point.

- [ ] Both, Salem and Samer's methods are correct.
- [ ] Both, Salem and Samer's methods are not correct.
- [ ] Samer is correct, while Salem is wrong.
- [x] Salem is correct, while Samer is wrong. ✓
- [x] Samer's method is used to find the arc length of a curve over an interval. ✓
- [ ] Both are wrong because the slope can be found for a line and not a curve at a point.

QUESTION 13

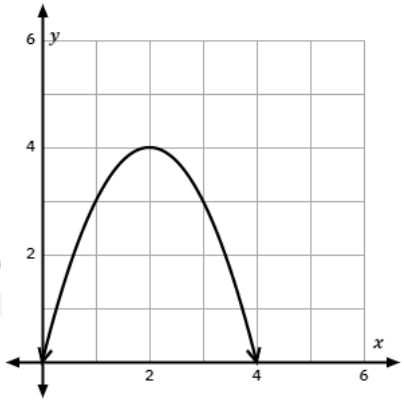
Select the statements that apply to the situation below.

Ahmed and Fares are estimating the arc length of a curve over a given interval. Ahmed suggested dividing the curve into 8 segments, while Fares said that dividing the curve into 4 segments is enough for a more accurate estimation.

- [x] Dividing the curve into 8 segments will reduce the gap between the segments and the graph so the estimation will be closer to the actual arc length. ✓
- [ ] Ahmed and Fares's suggestion both will give exactly the same estimation.
- [ ] Both Ahmed and Fare's suggestions are not correct because we don't divide the curve into segments when estimating the arc length.
- [ ] Fares's suggestion is better.
- [ ] Dividing the curve into 4 segments is enough because using 8 segments requires more calculations.
- [x] Ahmed's suggestion is better. ✓

QUESTION 14

Select your answer from the drop-down menu.



An engineer wants to cover the boundaries of an exhibition entrance having the shape of a parabola, as shown, of equation

$f(x) = -x^2 + 4x$

. He divided the curve into 6 segments to estimate the arc length of the curve.
The points taken are:

$A(0,0); B(0.5,1.75); C(1,3);\ D(2,4); E(3,3); F(3.5,1.75);$ and $G(4,0$

.

To have at most one extra meter, he should order around 10 meters of cover.