Question #1 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Let .

Let  be the average value of the function on the interval .

Let  be the solid generated when the region bounded by  and the vertical lines ,  is rotated about the -axis.

Let  be the volume of rotated about the -axis , the line , and .

Evaluate .

Question #1 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Let .

Let  be the average value of the function on the interval .

Let  be the solid generated when the region bounded by  and the vertical lines ,  is rotated about the -axis.

Let  be the volume of rotated about the -axis , the line , and .

Evaluate .

Question #2 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate: 

Question #2 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate: 

Question #3 Mu Bowl\_\_\_\_­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate each of the following limits. If the limit does not exist, assign it a value of -1. If the limit exists, assign the value the limit converges to. Find the sum of all of the limit values.

1.  
2.  
3.  
4.  

Question #3 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate each of the following limits. If the limit does not exist, assign it a value of -1. If the limit exists, assign the value the limit converges to. Find the sum of all of the limit values.

1.  
2.  
3.  
4.  

Question #4 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate each of the following integrals. If the integral converges, assign the integral the value of what the integral converges to. If the integral diverges, assign the integral a value of -2. Find the sum of the values of all of the integrals.

1. 
2. 
3. 

Question #4 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate each of the following integrals. If the integral converges, assign the integral the value of what the integral converges to. If the integral diverges, assign the integral a value of -2. Find the sum of the values of all of the integrals.

1. 
2. 
3. 

Question #5 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Consider the parametric equations:

.

Let be the value of the derivative of the function when .

Let  be the value of the 2nd derivative of the function when .

Let the interval  be the values of  for which the function is concave upward.

Evaluate .

Question #5 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

 Consider the parametric equations:

.

Let be the value of the derivative of the function when .

Let  be the value of the 2nd derivative of the function when .

Let the interval  be the values of  for which the function is concave upward.

Evaluate .

Question #6 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Let the slope of the curve  when .

Let  the minimum value of the slope of the curve .

The points on the curve  closest to the point  are expressed as .

Evaluate

Question #6 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Let the slope of the curve  when .

Let  the minimum value of the slope of the curve .

The points on the curve  closest to the point  are expressed as .

Evaluate 

Question #7 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Diego is a master at sequences and series. When Pamela asks him to help him with the following question:

“ Consider the series . If this series converges, find the sum. If it diverges, write DIVERGES”

Diego will put what as the correct answer?

Question #7 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Diego is a master at sequences and series. When Pamela asks him to help him with the following question:

“ Consider the series . If this series converges, find the sum. If it diverges, write DIVERGES”

Diego will put what as the correct answer?

Question #8 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Daniel Kang is the integration master. When Daniel is asked to find

 

his answer is . What is the value of ?

Question #8 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Daniel Kang is the integration master. When Daniel is asked to find

 

his answer is . What is the value of ?

Question #9 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate: 

Question #9 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate: 

Question #10 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

The region bounded by the curve  and the line  are rotated about the line . Its volume is expressed as .

The region bounded by the curve  and the line  are rotated about the . Its volume is expressed as .

The region bounded by the curve , , and  are rotated about the line . This volume is expressed as .

Find .

Question #10 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

The region bounded by the curve  and the line  are rotated about the line . Its volume is expressed as .

The region bounded by the curve  and the line  are rotated about the . Its volume is expressed as .

The region bounded by the curve , , and  are rotated about the line . This volume is expressed as .

Find .

Question #11 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate   (hint: use your knowledge of series)

Question #11 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Evaluate   (hint: use your knowledge of series)

Question #12 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

If the area enclosed by the inner loop of the graph  can be expressed as , find the value of .

Question #12 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

If the area enclosed by the inner loop of the graph  can be expressed as , find the value of .

Question #13 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Using the Maclaurin series for , approximate the value of  using the first three terms.

Question #13 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Using the Maclaurin series for , approximate the value of  using the first three terms.

Question #14 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Find the value of 2012th derivative of  at 

Question #14 Mu Bowl\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mu National Convention 2012

Find the value of 2012th derivative of  at 