1. Let’s calculate B first. B is the average value of the function on , which is represented by:

🡪 =  from 1 to 9🡪 . Therefore, .

 can be represented as -->🡪from 1 to 2. This equates to .

 can be calculated as 🡪🡪 from ¼ to 1. This equates to  from ¼ to 1🡪.

So the expression: =.

1. 🡪 🡪Now, use a u-substitution to evaluate the integral: 🡪 . This is a very simply trigonometric integral:

🡪 🡪 🡪Now we use the information to transform that back to x terms🡪  is the integral, now lets evaluate it from 2 to 5🡪 

is the answer.

1. 1) The limit as  approaches 0 of  does not exist since the left sided limit and right sided limit are not equal. The limit from the left side tends toward zero (making the entire limit from the left side 1/3) and the limit from the right side tends toward infinity (making the entire limit on the right side 0. Therefore, the limit doesn’t exist, and the value assigned is -1.

2) is a little bit harder to tell.

 =. Now manipulate this expression so it can be seen in the future that L’Hospitals rule can simplify🡪=, which goes to , so we can use L’hospitals rule🡪🡪=. So, 2) is assigned a value of 100.

3) Simplify this expression in rational form:

= . =. Now we can use L’Hospitals:

 =. 3) gets assigned a value of .

4) Combine the fractions and use L’Hospitals🡪. =1. 4) has a value of 1.

The sum of the limit values is: -1+100++1=. This is the answer.

4. 1) 🡪 Use a u-substitution🡪🡪🡪 from 1 to infinity is infinity. Diverges, assign value of -2.

2) 🡪use a u-substitution🡪🡪🡪🡪 Now split the integral up🡪 🡪Let’s see if the first integral converges🡪 🡪🡪=. This means the sum does not exist. This integral is assigned a value of -2.

3) This one converges🡪🡪🡪🡪. This turns into 🡪Now we need to determine 🡪 Now we are going to rearrange this into something that can be evaluated with L’Hospital’s rule🡪🡪🡪 Use L’Hospitals🡪 🡪🡪=0. The integral sums to -1+0=-1. This is the integral’s value.

The sum of the 4 integral values🡪 =. This is the answer.

1. First, let’s establish that . Therefore, . The value of the derivative at  is . Now, we use the fact: . Therefore, the second derivative of the function is . The value of the second derivative of the function at  is 6. Now, the second derivative is greater than 0 on the interval . So . Therefore, . 8 is the answer.
2. First lets implicitly derive this expression with respect to x🡪 🡪 🡪 🡪 . Go back to the original function to find the x-value for which 🡪 🡪So now, we evaluate  at this point🡪 . Therefore, .

B is a little bit more complicated. We are looking for the minimum slope, which means we have to derive the function, and derive it again to find the minimum of the derivative. , , and . . This is zero when . To verify, derive yet again; .  is always positive, therefore at , we have the minimum slope. Now, plug it back into 🡪 . Therefore, .

C is an application of finding the minimum of the distance function🡪 To minimize the distance between  and , set the function to be derived up like so: . Substitute  to obtain a single-variable expression🡪🡪🡪Expression is minimized when 🡪. Now, plug it back into the original formula🡪🡪. , so , and .

= . This is the answer.

1. If you evaluate the first terms of the series, you will see that this series is a telescoping series. Every term but the first, which is , and the last, which is  will cancel. Take the limit as  goes to infinity, which is just . This is the answer.
2. Evaluate the integral first, then plug in the bounds later🡪. Use a u-substitution to simplify this integral🡪🡪🡪🡪 . Now evaluate it at the bounds🡪 . This means that . Therefore, . This is the answer.
3. 🡪 🡪 🡪 
4. The first curve is rotated about the line . Disk method is used🡪 🡪 🡪 .

The second curve is about the x-axis. The washer method is used🡪The volume of one half of the solid is 🡪 . .

The last curve is rotated about the line .  . . This is the answer.

1. 🡪 Using information on series, 🡪Substitute this into the original expression: 🡪🡪🡪()=. Therefore, =. This is the answer.
2. . First, we need to find the bounds of the area integral🡪 , . We can find the area by doubling the integral to the half-way point, . So we set up the integral as🡪 🡪 🡪Integrating the first two expressions is easy🡪 . Using the fact , we can now set up the area as:

🡪 From  to , this becomes . Therefore, . This is the answer.

1. 🡪 🡪 🡪 🡪 🡪 Using the first three terms🡪 . This is the answer.
2. Derivatives of sin and cos functions go in cycles of 4. Since 2012/4=503, there is no remainder, which means that this is the same of taking the 0th derivative, which is sin(x). . This is the answer.