AP Calc AB Update Thursday March 26th

This will be my last posted update on the website. I will be moving over to Haiku as it offers more opportunity for discussion and I may experiment with some videos there.

It seems like we have been off for more than 2 weeks. There is still plenty of time to prepare for the AP exam, so please consider taking next week completely off. Prayerfully, our nation will be better shape in 10 days when we start up again. Beginning April 6th, I will have a more daily structure approach to the class through Haiku. By then, we show have more details about the AP exam and about how grading will work through the remainder of the semester.

Mr. Tupaj

Here is an overview of the Area and Volume FRQ Classwork.

Setup Review

1. Area between functions: $\int_a^b [f(x) - g(x)]\, dx$ where $f(x) > g(x)$ and the limits b and a are either given or are points of intersection.

2. Volume of revolution around a horizontal line (x-axis or y = k)

$\pi \int_a^b [R(x)^2 - r(x)^2] dx$ R(x) = outer radius = outer edge of region – line
r(x) = inner radius = inner edge of region – line
limits of integration are x-values

3. Volume of revolution around a vertical line (y-axis or x = k)

$\pi \int_a^b [R(y)^2 - r(y)^2] dy$ R(y) = outer radius = outer edge of region – line
r(y) = inner radius = inner edge of region – line
limits of integration are y-values

4. Volume of solid with known cross sections perpendicular to x-axis, all functions must by y = f(x), limits of integration are x-values

Constant: k = $\frac{1}{2}$ if isosceles right triangle, k = $\frac{\sqrt{3}}{4}$ if equilateral triangle, k = $\frac{\pi}{8}$ if semi-circles.

If cross sections are perpendicular to the y-axis, all functions must be x = f(y)
limits of integration are y-values.

Other shapes: Integrate the area $\int_a^b Area\, dx$

Classwork #1

The hard part about this question is that no calculator is allowed. Part a is simple area. Part b is tricky because the area is given. How do you find volume given area? Watch out of u-substitution when you integrate. Part c is straightforward but catch that the cross sections are perpendicular to the y-axis.

Classwork #2

Again, this is no calculator. Basic area in part a. The answer key uses geometry for part of the answer. I think it is easier just to integrate. Like problem #1, part b has a given area to work with. And then part c goes in a completely different direction. What do you know about the slope of g(x)? What do you know about the slope perpendicular to f(x). Make an equation with these two slopes being equal and solve for x.

Classwork #3

This one requires a calculator. Part a is easy if you know how to find the points of intersection with your calculator. Part b requires some though to break up region S into parts. The answer key splits S into a rectangle in the middle along with two integrals. Part c is a straightforward volume of revolution with the same points of intersection as part a. Watch out for the outer and inner radius.

Classwork #4

Parts a and b are straightforward and require calculators for points of intersection. Note that part b is just for region S, so there is no split integral. Part c goes back to first semester. It is an easy question but being out of context makes it confusing. How do you set up the vertical distance between f(x) and g(x)? How do you find the change in this distance at x = 1.8?

The answers to these 4 problems are posted, but please attempt them on your own first.