Math 8
Winter 2020

Written Homework Day 9
Assigned Friday, January 24

Note: Standard (not preliminary) written homework is graded on your work and your explanations, not just on your answer.

Explanations are important for many reasons. Being able to communicate what you know shows a depth of understanding beyond that of being able to get the right answer to a problem. Doing the mental work of putting explanations into words helps create that depth of understanding. On exams, we will grade your work and not just your answers, so this is good practice for taking exams.

For all these reasons, be sure to: show all your work; explain your reasoning; use clear English; write neatly so all this effort does not go to waste.

Written homework is always due at 10:00 AM on the following Monday.

The picture below depicts a cross section of a (fictitious) volcanic mountain before it erupts. The contour of the mountain can be described by the function $f(x) = \dfrac{1}{x - \frac{3}{2}}$ for $2 \le x \le 10$.
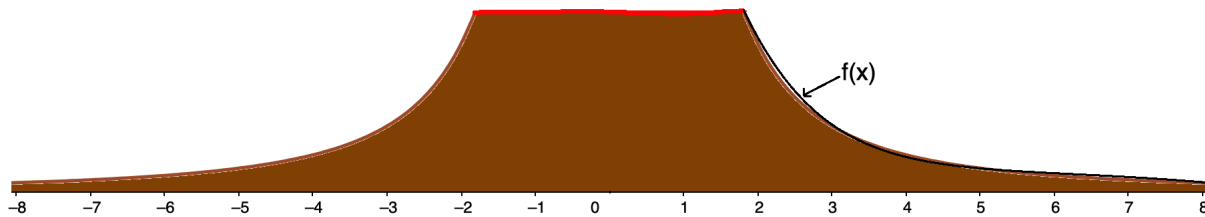
After the volcano erupts, magma flowing out of the volcano changes the landscape around the mountain. When the magma has cooled the new contour of the mountain can be described by the function $g(x) = \cos(\frac{x}{4}) + 1$ for $2 \le x \le 10$, as depicted (in cross section) below below:
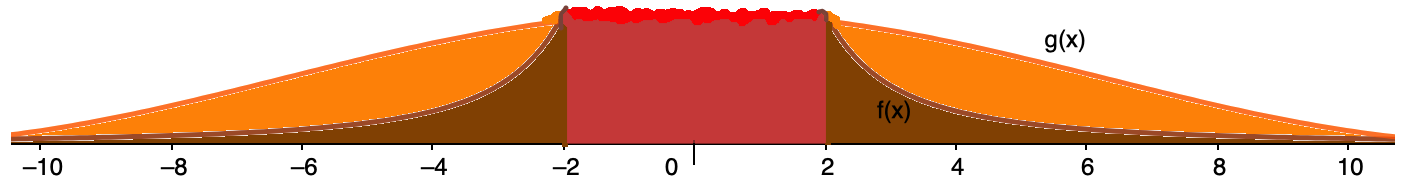
(a) Assuming the shape of the mountain before and after the eruption is symmetric about its center with any cross section, express the volume of magma (shown in orange in the picture) spewed between a radius of $r = 2$ and $r = 10$ units from its center as a Riemann sum. (Hint: Break up the deposited magma into narrow rings surrounding the volcano)

(b) Take a limit of your answer in (a) to express the volume as an integral.