Peer Questions for Section 7.5

In your group (minimum of two people per), discuss your responses to the following questions. Rotate (again) the role of "group scribe", a person who should submit your group’s responses, using the web form below, by 5 pm, Fri., Sept. 27.

The formula for the surface area of a frustrum of a cone

\[ A = 2\pi rl, \]  

(1)

where the letters are defined according to the red figure below, and \( r = (r_1 + r_2)/2 \) is the average radius, is the basis for the integral formulas in Boxes 4-8 one uses to compute the surface area for a solid of revolution. It tells us that, for surface area, it isn’t the height of the frustrum, labeled \( h \) in the yellow figure, that matters directly, but rather the slant length \( k \). Moreover, as intuition confirms, two frustrums (the yellow and the red) can have the same average radius,

\[ \frac{1}{2}(a + b) = \frac{1}{2}(r_1 + r_2), \]

and yet the first has more surface area because the slant length \( k > \ell \).

1. The formula

\[ S = \int_a^b 2\pi f(x) \sqrt{1 + [f’(x)]^2} \, dx \]

yields surface area for a curve \( y = f(x) \) that is rotated about the \( x \)---axis. In this formula the expression b) \_________ takes the role of the radius \( r \) in Equation (1), and c) \_________ takes the role of the slant height \( \ell \).

2. Consider the examples in the text. If your curve is an ellipse,

\[ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, \]

as in Exercise 21, p. 397, how do you proceed?

3. For this particular evening’s questions, send me your answers individually ahead of time using the web form. (Make sure I receive them before the start of next class period, Fri., Sept. 27.) Once you have discussed them in group on that day, follow the usual procedure, having a scribe send me the group’s answers.

4. Identify one item (a concept, a step in an example, a statement, etc.) from this reading assignment you found difficult or confusing.