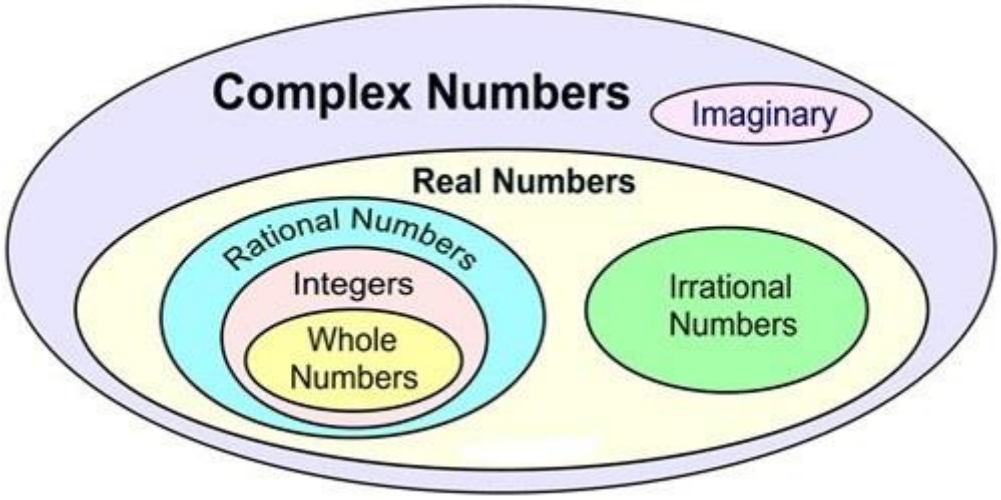
MATH 162: HOMEWORK F

1. Gilberte is trying to evaluate the following indefinite integral:

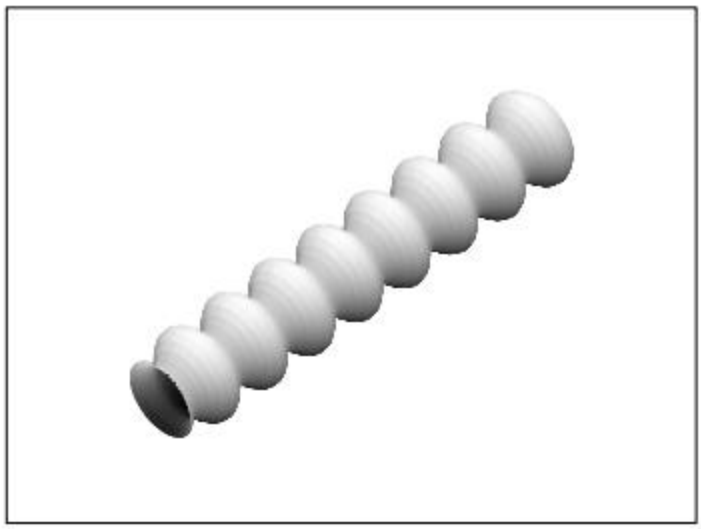
$$\int \left(e^{e^x + e^{-x} + x} - e^{e^x + e^{-x} - x} \right) dx$$

She depends upon her good friend Albertine to help her. What should Albertine tell Gilberte?

2. Find all solutions to the equation $z^3 = -i$.



3. Albertine has designed a decorative table leg (illustrated below). She wants it to be manufactured so that it is the solid of revolution of the function f(x) = 4 + sin x between x = 0 and x = 16π cm.



(a) What is the volume of the table leg? Show all work, although you may use Mathematica to evaluate any integrals.

(b) Marcel tells Albertine that there is a shortcut: He explains: replace the relatively complicated shape with a cylinder with height 16π and radius 4 (because the average radius above is 4), and apply the volume formula for a cylinder. Is Marcel correct? Explain!

What do you think Albertine will say?

4. Swann attends a seminar at l'Ecole Polytechnique on architecture in ancient Egypt. He learns that the great pyramid of Giza in Egypt was originally (approximately) 480 ft. high. Its base was originally (again, approximately) a square with side length of 760 ft.

(a) Growing bored, Swann sketches a slice that could be used to calculate the volume of the pyramid by integration. Introducing appropriate variables, Swann writes the volume of the slice regarding those variables. Find an expression representing this volume.

(b) Using Swann's slice expression, show how he would calculate the volume of the pyramid.