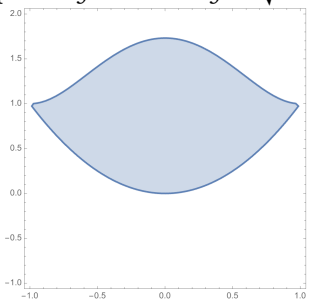
Problem Set #3

Due Friday, February 16, 2024 @ 12:30 pm
Submit as single pdf file to Canvas

Remember to review the Guidelines for WeBWorK and Problem Sets on the course webpage when writing up your solutions. The rule of thumb is that you should give enough explanation so that you could hand your assignment to a student who took Calc II last semester and they could follow your solutions.

Let R be the region bounded by the graphs of $y = x^2$ and $y = \sqrt{\cos(\pi x) + 2}$

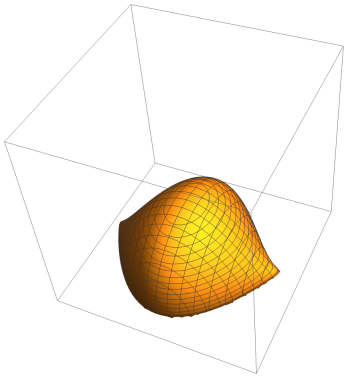


1. Approximate the area of R using Simpson's rule with 20 subdivisions. How accurate is your answer? Be sure to explain how you know your approximation is this accurate.

2. Consider the solid formed when R is rotated about the x-axis
   (a) Sketch the solid.
   (b) Set up the integral that gives the volume of the solid.
   (c) Find the volume of the solid.
   Note that you should not use a numeric approximation, like T_n or S_n, for this part.

3. Consider the solid formed when R is rotated about the line $y = -3$.
   (a) Sketch the solid.
   (b) Set up the integral that gives the volume of the solid.
   (c) Use S_{20} to approximate the volume of the solid.
   (d) How accurate is your approximation?

4. Consider the solid whose base is R and where cross-sections perpendicular to the x-axis are semi-circles whose diameters lie on R.



   (a) Set up the integral that gives the volume of the solid.

   (b) Use S_{20} to approximate the volume of the solid.

   (c) How accurate is your approximation?

5. The purpose of this problem is to find the total perimeter of R

   (a) Set up the integral that gives the length of the top boundary of R

   (b) Use S_{20} to approximate the length of the top boundary of R

   (c) Set up the integral that gives the length of the bottom boundary of R

   (d) Use S_{20} to approximate the length of the bottom boundary of R

   (e) What is the total perimeter of R?