Math 1080: Calculus of One Variable II

Self-Check Homework 1

Velocity and Net Change (6.1), Regions Between Curves (6.2), and Volume by Slicing (6.3)

(Not collected/graded)

You are encouraged to work the following problems for practice (ignore the points listed per problem). Form a study group and work problems from these self-check assignments together! Doing problems helps you learn the material and prepares you for quizzes and exams. A key will also be posted in Canvas for you to check your work. When checking your solution against the key, pay attention not only to differences between your answer and the solution but also differences in terms of your notation and how you communicated your solution.

1. (6 points) Consider an object moving along a line with velocity $v(t) = 1 - 2\cos(\pi t/3)$, for $0 \leq t \leq 3$, and initial position $s(0) = 0$. Assume time t is measured in seconds and velocities have units of m/s.
   (a) Over the given interval, determine when the object is moving in the positive direction and when it is moving in the negative direction.

   (b) Find the displacement over the given interval.

   (c) Find the distance traveled over the given interval.

   (d) Determine the position function $s(t)$.

2. (6 points) Sketch the region enclosed by the given curves and find its area.
   (a) $x = y^4$, $y = \sqrt{2 - x}$, $y = 0$

   (b) $y = \cos x$, $y = 1 - \cos x$, $0 \leq x \leq \pi$

3. (4 points) Find the volume of the solid S where the base of S is the region enclosed by the parabola $y = 1 - x^2$ and the x-axis. Cross-sections of S perpendicular to the y-axis are squares.

4. (4 points) Consider the region bounded by $y = 4 - x^2$, $x = 2$, and $y = 4$. Using the **disk/washer method**, **set up** but do not evaluate or simplify the integral(s) for the volume of the solid generated by rotating the region about:

   (a) the y-axis

   (b) the line $y = 4$