AP Calculus
7.3 Worksheet (Day 1)

All work must be shown in this course for full credit. Unsupported answers may receive NO credit.

1. The base of a solid is the region enclosed by the graph of $y = e^{-x}$, the coordinate axes, and the line $x = 3$. If all plane cross sections perpendicular to the x – axis are squares, then its volume is

A) $\frac{1-e^{-6}}{2}$

B) $\frac{1}{2}e^{-6}$

C) e^{-6}

D) e^{-3}

E) $1-e^{-3}$

2. [Calculator] The base of a solid S is the region enclosed by the graph of $y = \sqrt{\ln x}$, the line $x = e$, and the x-axis. If the cross sections of S perpendicular to the x – axis are semicircles, then the volume of S is

3. The base of a solid is the region bounded by the lines $f(x) = 1 - \frac{x}{2}$, $g(x) = -1 + \frac{x}{2}$, and $x = 0$. If the cross sections perpendicular to the x-axis are equilateral triangles, find the volume of the solid.

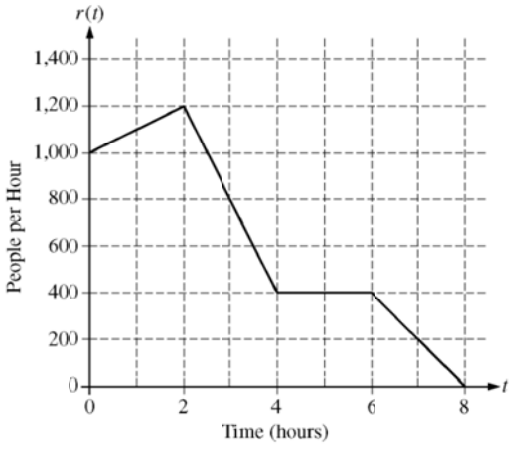
4. [Calculator] Let R be the region enclosed by the graphs of $y = \ln\left(x^2 + 1\right)$ and $y = \cos x$.

a) Find the area of R.

b) The base of a solid is the region R. Each cross section of the solid perpendicular to the x-axis is an equilateral triangle. Write an expression involving one or more integrals that gives the volume of the solid. Do not evaluate.

5. Complete the following questions from your textbook: page 406 #1, 3, 41, and 42

6. There are 700 people in line for a popular amusement-park ride when the ride begins operation in the morning. Once it begins operation, the ride accepts passengers until the park closes 8 hours later. While there is a line, people move onto the ride at a rate of 800 people per hour. The graph above shows the rate, $r(t)$, at which people arrive at the ride throughout the day. Time t is measured in hours from the time the ride begins operation.



a) How many people arrive at the ride between $t = 0$ and $t = 3$? Show the computations that lead to your answer.

b) Is the number of people waiting in line to get on the ride increasing or decreasing between $t = 2$ and $t = 3$? Justify your answer.

c) At what time t is the line for the ride the longest? How many people are in line at that time? Justify your answers.

d) Write, but do not solve, an equation involving an integral expression of r whose solution gives the earliest time t at which there is no longer a line for the ride.