Math 172  Disks  Name: 

You will find the following identities useful.

\[ \cos 2x = \cos^2 x - \sin^2 x \quad \tan^2 x + 1 = \sec^2 x \quad \int \sec u du = \ln |\sec u + \tan u| + c \]

1. Consider the region bounded by \( y = \sqrt{x}, y = (3-x)/2, \) and the \( x \)-axis. Carefully sketch the region.

   (a) 4 The region is rotated about \( y = 2 \). Express the volume as a sum of two integrals. Do not evaluate.

   \[
   \int \ldots
   \]

   (b) 6 The region is rotated about \( x = 4 \). Find the volume.

2. 10 Consider the region bounded by \( y = \ln x, x = e, \) and the \( x \)-axis. Carefully sketch the region. The region is rotated about the \( y \)-axis, find the volume.

   \[
   \int \ldots
   \]
3. Consider the region bounded by $y = \cos x$ and $y = \sin x$ for $x \in [0, \pi/4]$. Carefully sketch the region.

(a) The region is rotated about the $y$-axis. Express the volume as a sum of two integrals. Do not evaluate.

(b) The region is rotated about the $x$-axis. Find the volume.

4. Consider the region bounded by $y = \tan x$ and $y = \sec x$ for $x \in [0, \pi/4]$. Carefully sketch the region. The region is rotated about the line $y = 2$, find the volume.