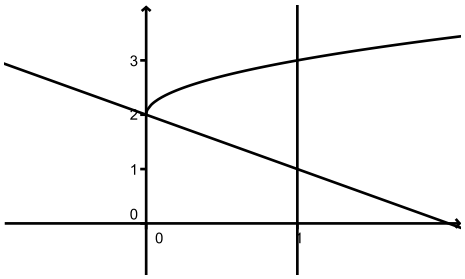
Math 31 – Workshop #5

Note: If your class is doing Techniques of Integration before Volumes, skip to problem number 4.

1. The region bounded by the graphs of $y = 2 + \sqrt{x}$, $y = 2 - x$, and $x = 1$ is rotated about the x-axis. Find the volume of the resulting solid.



2. The region bounded by the graphs of $f(x) = \ln x$, $y = 1$, the x-axis, and the y-axis is rotated about the y-axis. Find the volume of the resulting solid using the disk method. (Hint: Use horizontal rectangles.)

3. The region bounded by the graphs of $y = \ln x$ and the lines $y = x$, $y = 0$, and $y = 2$ is rotated about the y-axis. Find the volume of the resulting solid.

4. Integrate the following.

   (a) $\displaystyle\int \frac{1}{2 - 5x}\, dx$

   (b) $\displaystyle\int_0^{\frac{\pi}{4}} (1 + \tan x) \sec^2 x\, dx$

   (c) $\displaystyle\int \frac{\sqrt{1 + \cot x}}{\sin^2 x}\, dx$

5. Each of the following integrals represents the area of a region between two curves. Sketch the region.

   (a) $\displaystyle\int_1^e (1 - \ln x)\, dx$

   (b) $\displaystyle\int_{\frac{3}{2}}^3 \left[(7 - 2x) - \frac{2}{x - 1}\right] dx$

6. Consider the region bounded by the graphs of $y = \ln x, y = 1, y = 2$, and $x = 0$.

   (a) Set up a dx integral that computes the area of this region.

   (b) Set up a dy integral that computes the area of this region.