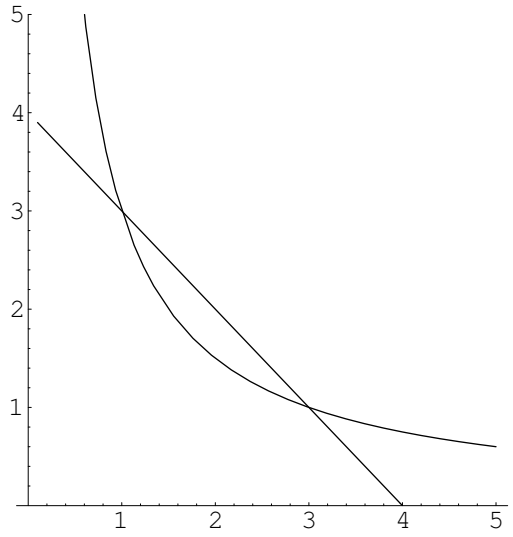
Prof. Haiman Math 1A—Calculus Fall, 2006

Quiz 14 solutions

Name _____ Student ID Number _____

1. Find the area of the region enclosed by the curves $xy = 3$ and $x + y = 4$.

The region looks like this.



Solve $xy = 3$ and $x + y = 4$ simultaneously to find the corners of the region at $(1, 3)$ and $(3, 1)$. Then the area is given by

$$\int_1^3 4 - x - (3/x)\, dx = 4x - \frac{x^2}{2} - 3\ln x \Big]_1^3 = 4 - 3\ln 3.$$

2. Find the volume of the right circular cone with height 2 and base radius 1.

Slicing horizontally and subsituting $u = 2 - z$, get

$$\int_0^2 \pi((2-z)/2)^2\, dz = \frac{\pi}{4}\int_0^2 u^2\, du = \frac{2\pi}{3}.$$

Or, if you remembered the formula $V = \pi r^2 h/3$ that you derived on the homework, you can just plug in $r = 1$ and $h = 2$.