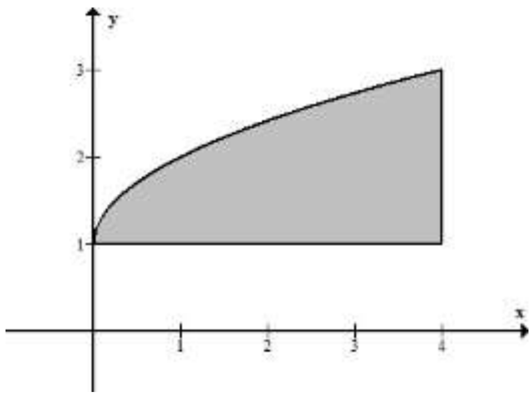
Section 6.1

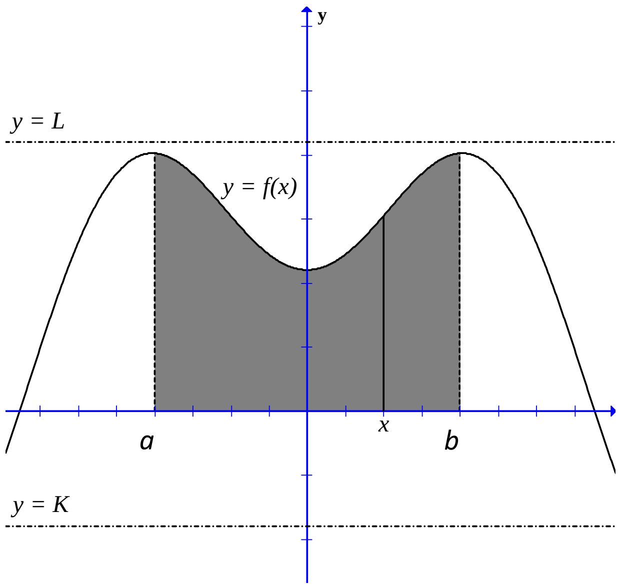
After viewing the lecture videos and reading the textbook, you should be able to answer the following questions:

1. Consider the region that is bounded by the graphs of $y = 1 + \sqrt{x}$, $x = 4$, and $y = 1$. If we revolve the region about the x-axis, it forms a solid of revolution whose cross sections are washers.



   a) What is the outer radius, $R(x)$, of a cross section of the solid at a point x in $[0,4]$?
   b) What is the inner radius, $r(x)$, of a cross section of the solid at a point x in $[0,4]$?
   c) What is area, $A(x)$, of a cross section of the solid at a point x in $[0,4]$?
   d) Write an integral for the volume of the solid.

2. The Disk/Washer Method about a horizontal line: $\boldsymbol{V = \int_a^b \pi\left(\left(R(x)\right)^2 - \left(r(x)\right)^2\right)dx}$



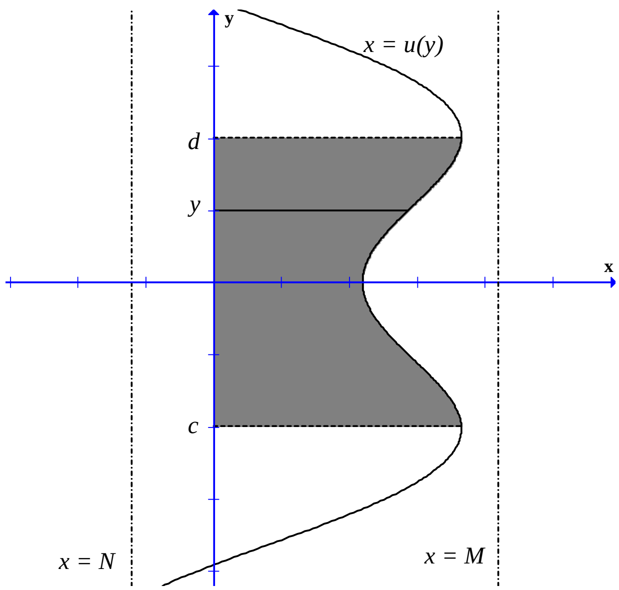
Set up the integral to find the volume of the solid generated by rotating the region bound by the curve $y = f(x)$ and the x-axis over the interval $[a, b]$ about:

a) the x-axis.

b) the line $y = L$.

c) the line $y = K$.

3. The Disk/Washer Method about a vertical line: $V = \int_c^d \pi\left(\left(R(y)\right)^2 - \left(r(y)\right)^2\right)dy$



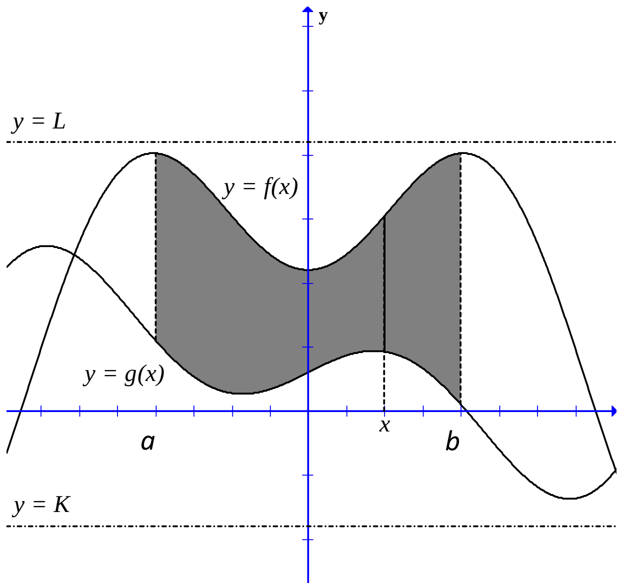
Find the volume of the solid generated by rotating the region bound by the curve $x = u(y)$ and the y-axis over the interval $[c, d]$ about:

a) the y-axis.

b) the line $x = M$.

c) the line $x = N$.

4. The Washer Method about a horizontal line: $V = \int_a^b \pi\left(\left(R(x)\right)^2 - \left(r(x)\right)^2\right) dx$



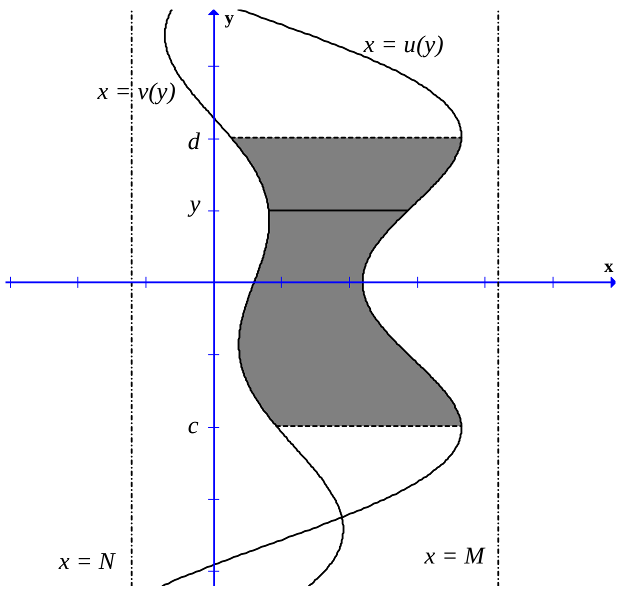
Find the volume of the solid generated by rotating the region bound by the curves $y = f(x)$ and $y = g(x)$ over the interval $[a, b]$ about:

a) the x-axis.

b) the line $y = L$.

c) the line $y = K$.

5. The Washer Method about a vertical line: $V = \int_c^d \pi\left(\left(R(y)\right)^2 - \left(r(y)\right)^2\right) dy$



Find the volume of the solid generated by rotating the region bound by the curves $x = u(y)$ and $x = v(y)$ over the interval $[c, d]$ about:

a) the y-axis.

b) the line $x = M$.

c) the line $x = N$.

NOTE: For the disk/washer method, your "cuts" (the line drawn through the region at either a random value of x or at a random value of y) are <u>perpendicular</u> to the line about which you are rotating.

You integrate with respect to x if your cuts are perpendicular to the x-axis (that is, if your cuts are vertical).

You integrate with respect to y if your cuts are perpendicular to the y-axis (that is, if your cuts are horizontal).