LECTURE OUTLINE
Our Friend the Integral

Professor Leibon

Math 8

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Goals

Course Information

Integral Review

Area Between Curves

Volumes of Revolution

Areas between curves

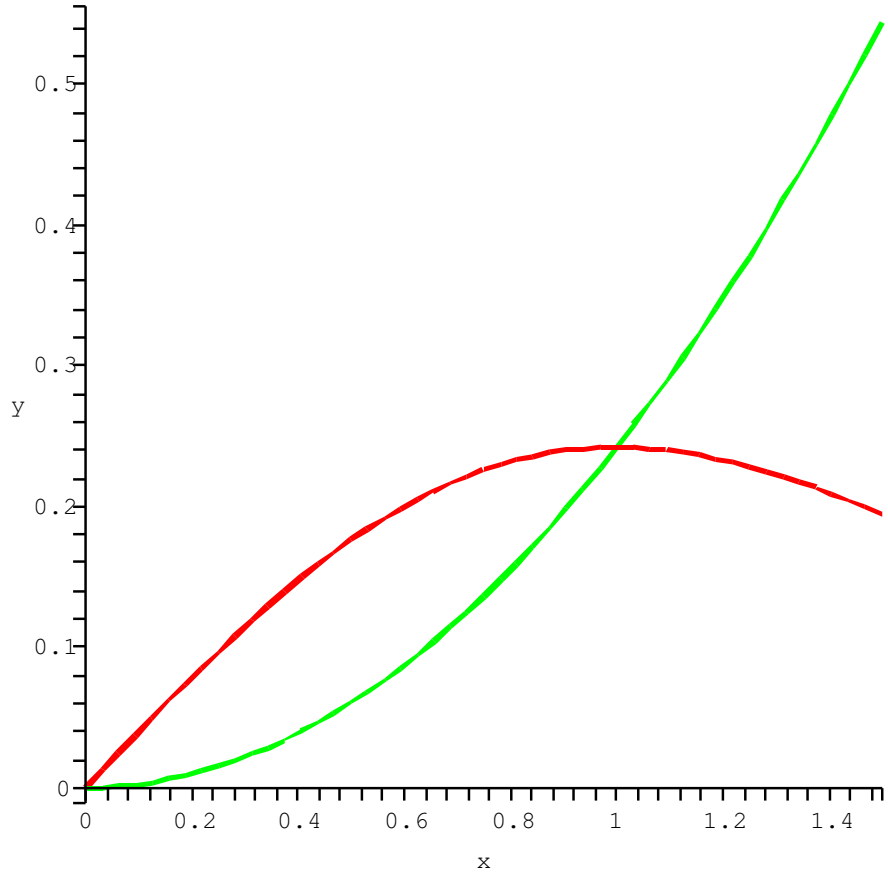
The area A of the region bounded by the curves $y = f(x)$ and $y = g(x)$, and the lines $x = a$, $x = b$, where f and g are continuos and $f(x) \geq g(x)$ for all x in $[a, b]$ is

$$A = \int_a^b (f(x) - g(x))\, dx.$$

Example 1

Find the area of the region bounded by $y = xe^{-\frac{x^2}{2}}$ and $y = \frac{1}{\sqrt{e}}x^2$ and the lines $x = 0$, $x = t$, where $t > 0$.

Example 1



Volumes of Revolution

Let S be a solid that lies between $x = a$ and $x = b$. If the cross sectional area of S in the plane P_x, through x and perpendicular to the $x - axis$ is $A(x)$, where A is a continuous function, then the volume of S is

$$V = \int_a^b A(x)dx$$

Example 2

Find the volume of the region obtained by rotating the region bounded by $y = \sin(x)$ from 0 to 2π about the x-axis. Such a region is called a *volume of revolution*.

Example 2