Closing Wed: HW_2A,2B,2C
Closing Next Wed: HW_3A,3B,3C

Entry Task:
Using substitution, evaluate:

$$(a)\ \int \frac{(\ln(x))^3}{x}\ dx$$

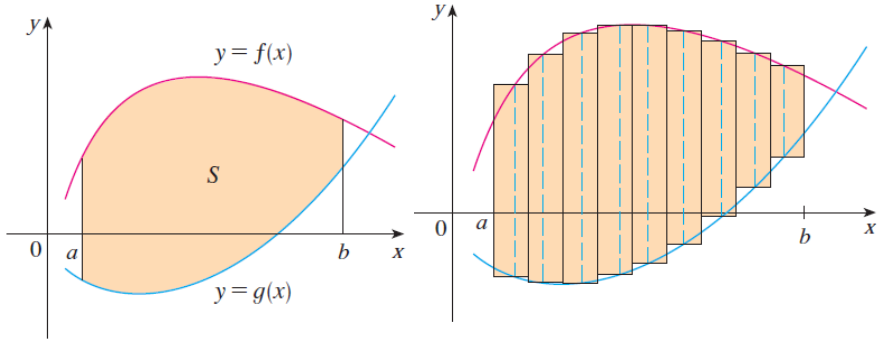
$$(b)\ \int_1^2 e^{5x}\ dx$$

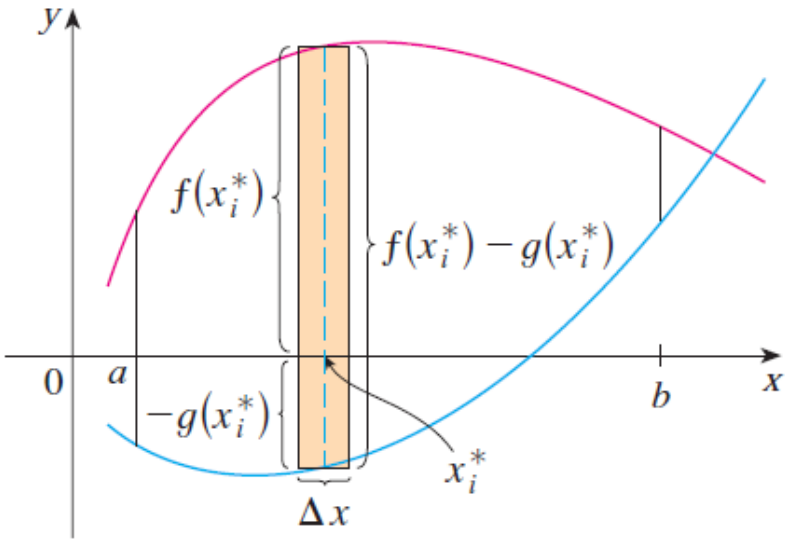
$$(c)\ \int x^3\sqrt{1+x^2}\,dx$$

Ch 6: Basic Integral Applications

6.1 Areas Between Curves

Using dx:

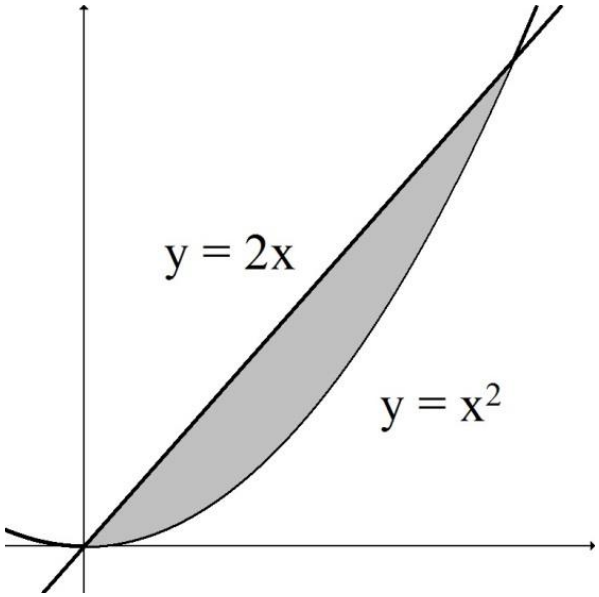




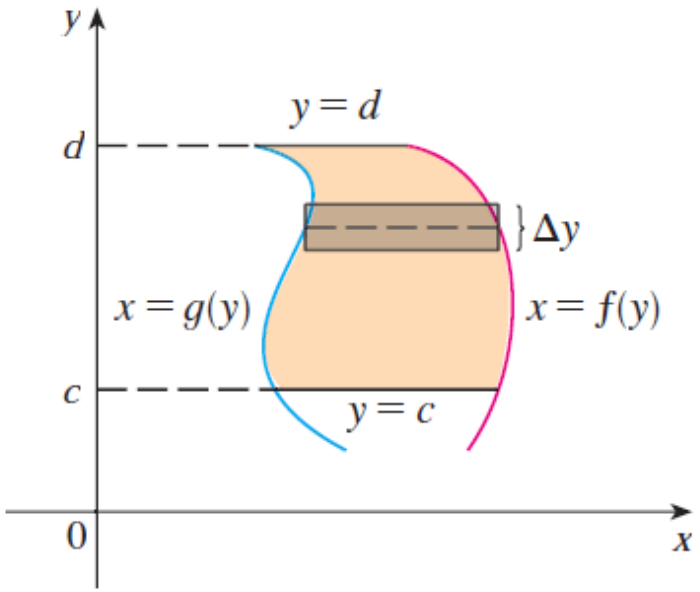
(a) Typical rectangle

$$\text{Area} = \lim_{n\to\infty} \sum_{i=1}^{n} (f(x_i) - g(x_i))\Delta x$$

Example: Find the area bounded between $y = 2x$ and $y = x^2$.

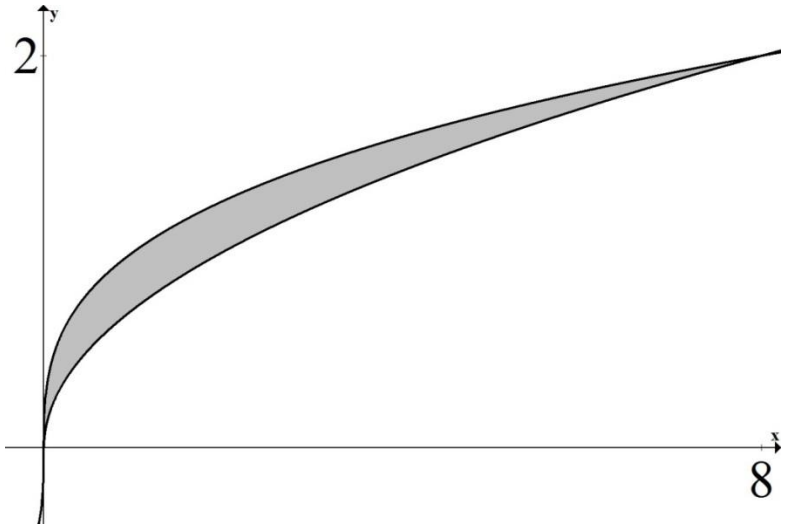


Using dy:



$$\text{Area} = \lim_{n\to\infty} \sum_{i=1}^{n} (f(y_i) - g(y_i))\Delta y$$

Example: Set up an integral for the area bounded between $x = 2y^2$ and $x = y^3$ (shown below) using dy.



Summary: The area between curves

1. Draw picture finding all intersections.
   - x = a = smallest x-value in region
   - x = b = biggest x-value in region
   - y = c = smallest y-value in region
   - y = d = biggest y-value in region

2. Choose dx or dy. And get everything in terms of the variable you choose.

3. Draw a typical approx. rectangle.

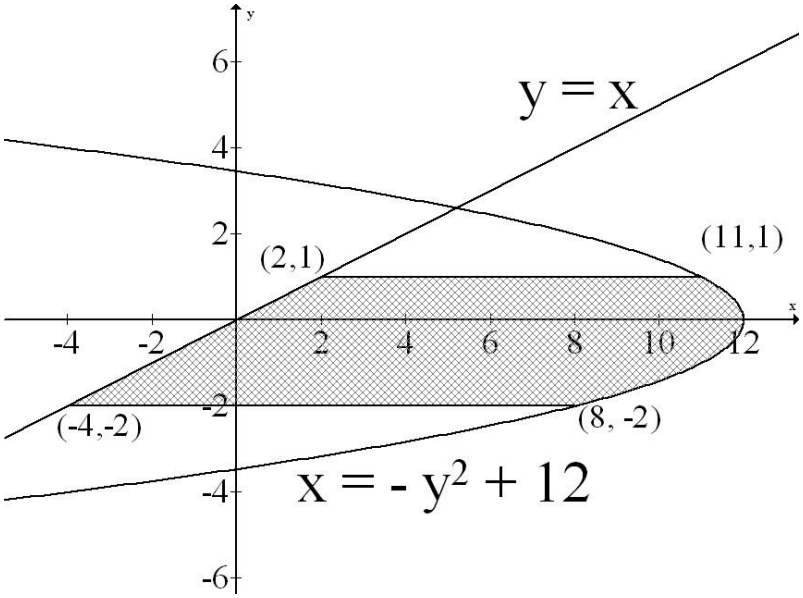
4. Set up as follows:

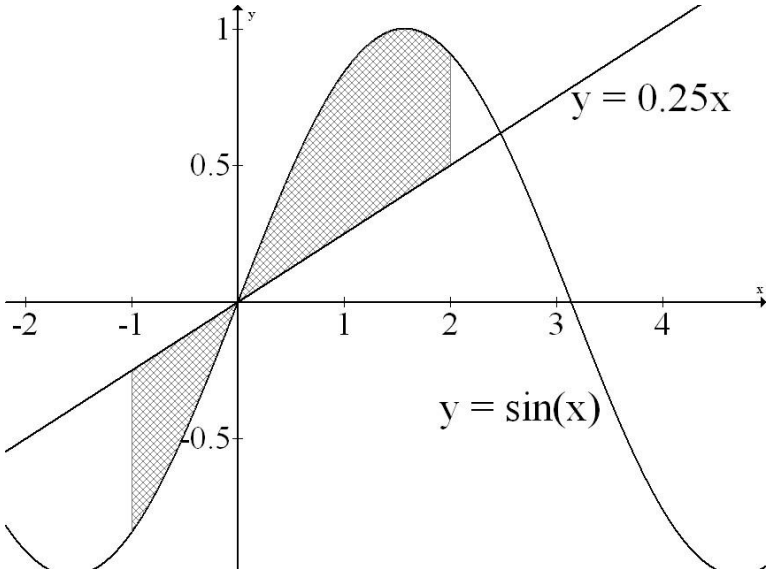
$$\text{Area} = \int_a^b (\text{TOP} - \text{BOTTOM})\, dx$$

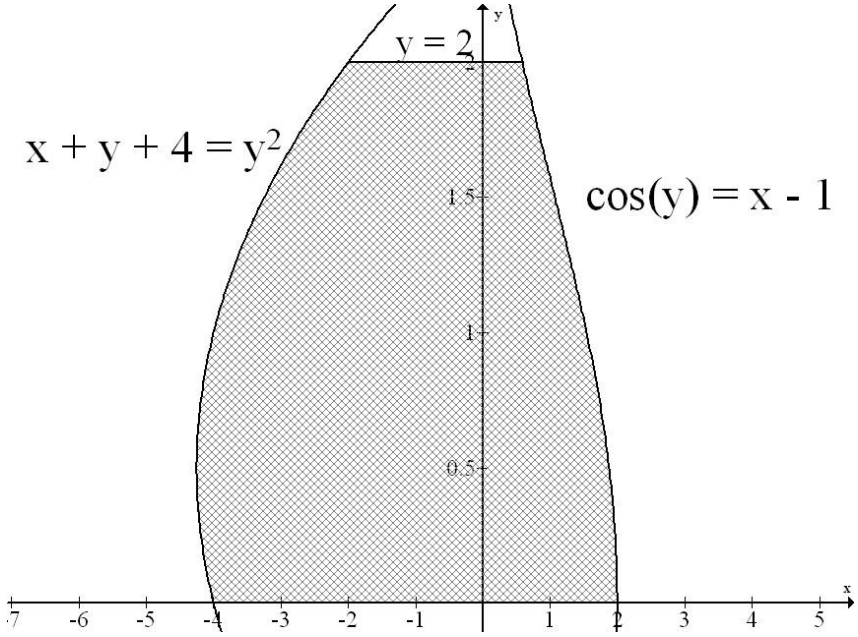
$$\text{Area} = \int_c^d (\text{RIGHT} - \text{LEFT})\, dy$$

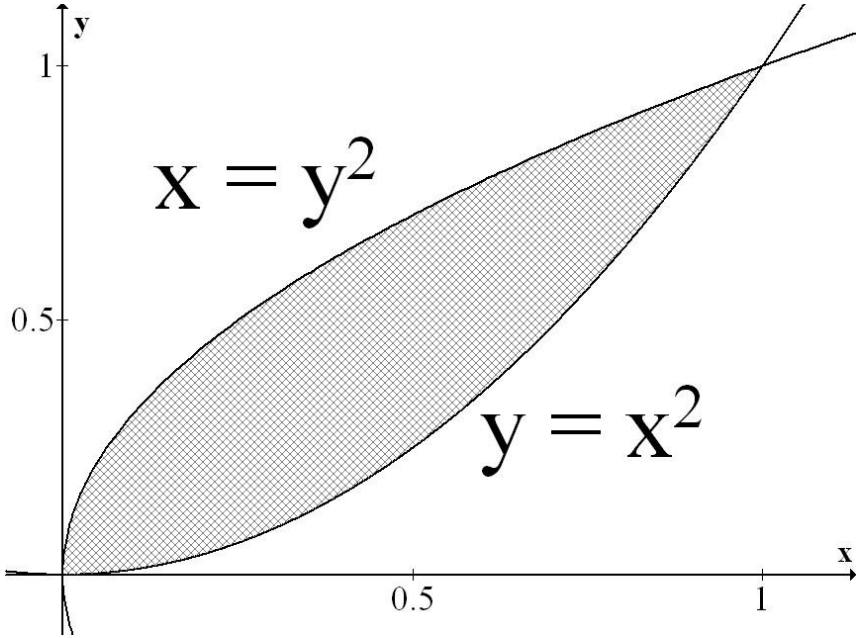
Example: Set up an integral (or integrals) that give the area of the region bounded by $x = y^2$ and $y = x - 2$.

Set up an integral for the total positive area of the following regions:






y = 2
x + y + 4 = y2
cos(y) = x - 1
y
x
1.5
1
0.5
-7
-6
-5
-4
-3
-2
-1
1
2
3
4
5


y
x
1
0.5
x = y2
y = x2
0.5
1