Closing Today: HW_2A, 2B, 2C

Closing Next Wed: HW_3A, 3B, 3C

Exam 1 is next Thurs (4.9, 5.1-5.5, 6.1-6.3)

Entry Task:

Using substitution, evaluate:

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

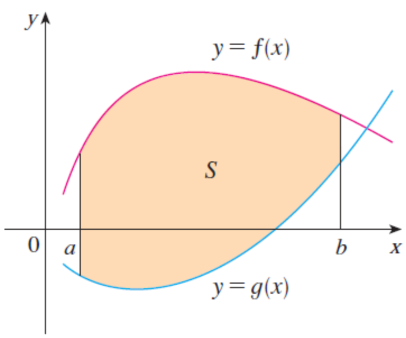
$$(b) \int_1^2 e^{5x} \, dx$$

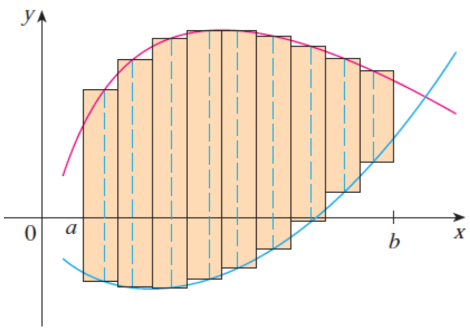
$$(c) \int \frac{x^5}{x^3 + 1} dx$$

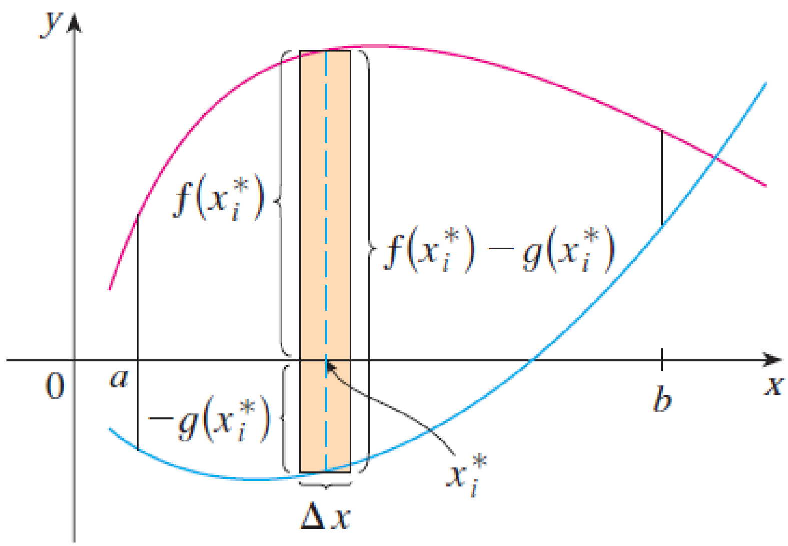
Ch 6: Basic Integral Applications

<u>6.1 Areas Between Curves</u>

Using dx:



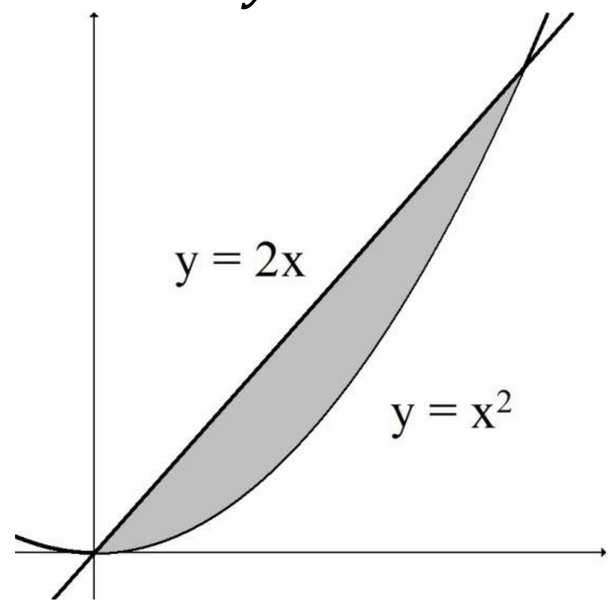




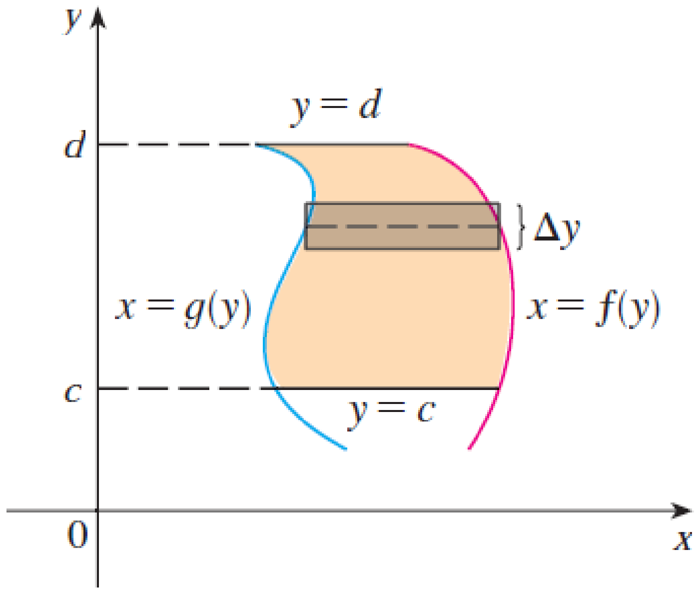
(a) Typical rectangle

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

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

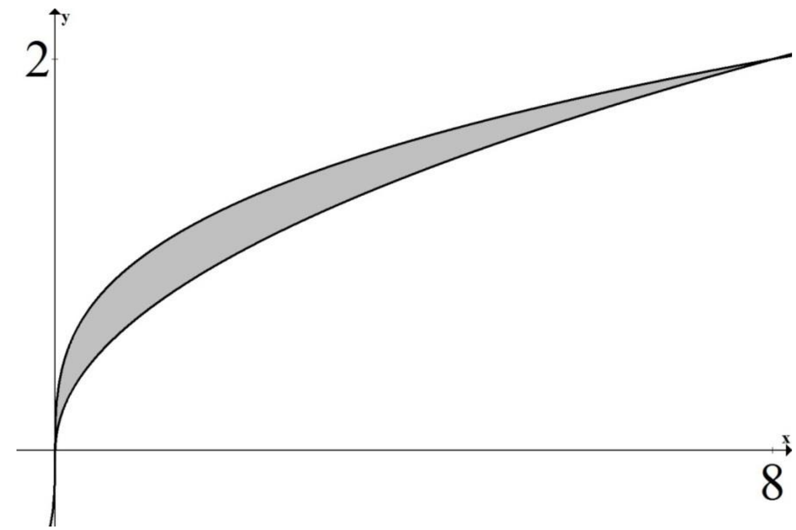


Using dy:



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

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.

2. Choose dx or dy. Get ***everything*** in terms of the variable you choose.

3. Draw a typical approx. rectangle.

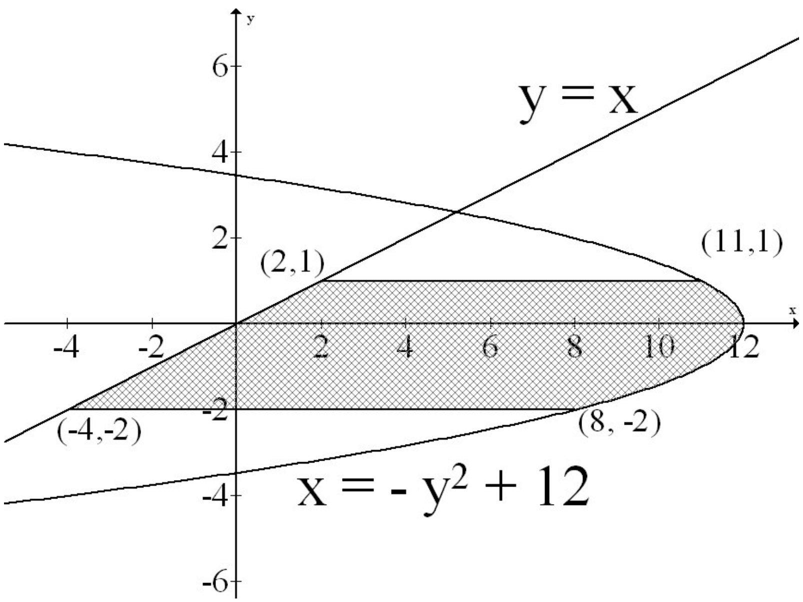
4. Set up as follows:

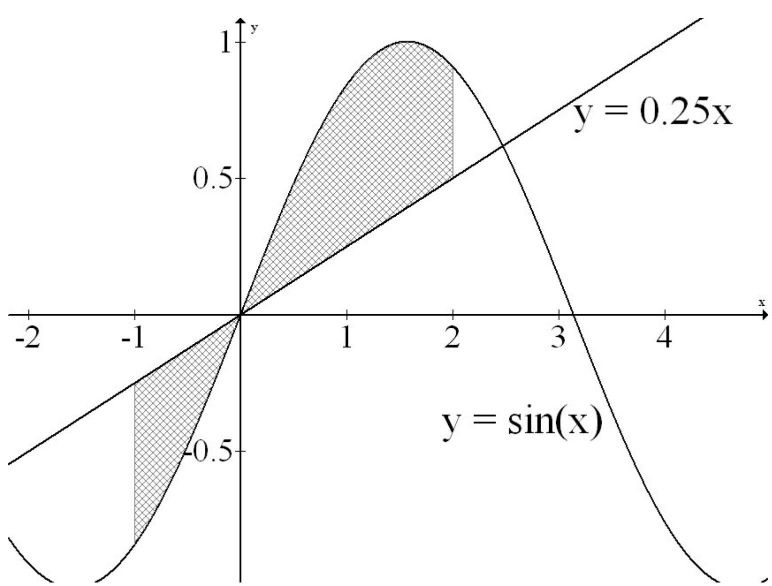
$$\text{Area} = \int_a^b (\text{TOP} - \text{BOTTOM})\, dx$$

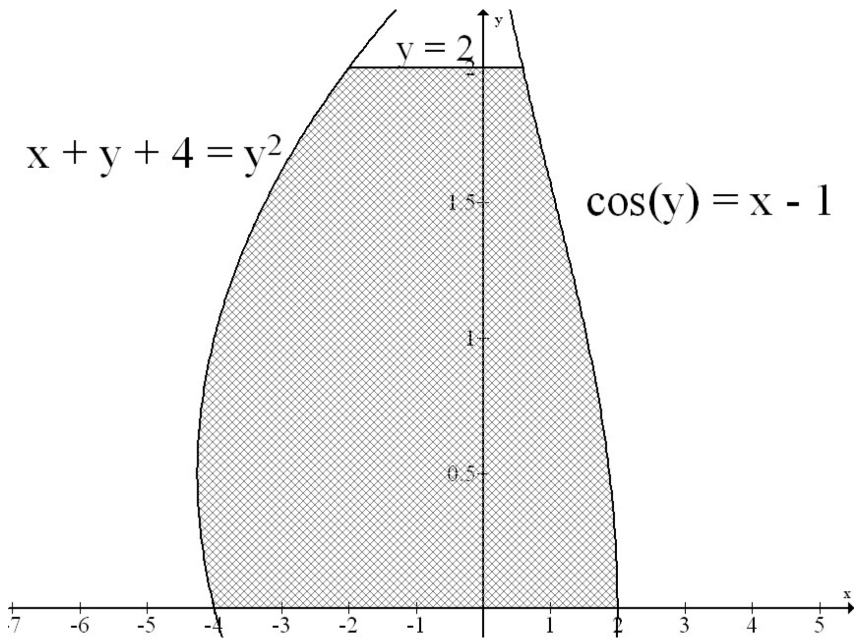
$$\text{Area} = \int_c^d (\text{RIGHT} - \text{LEFT})\, dy$$

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

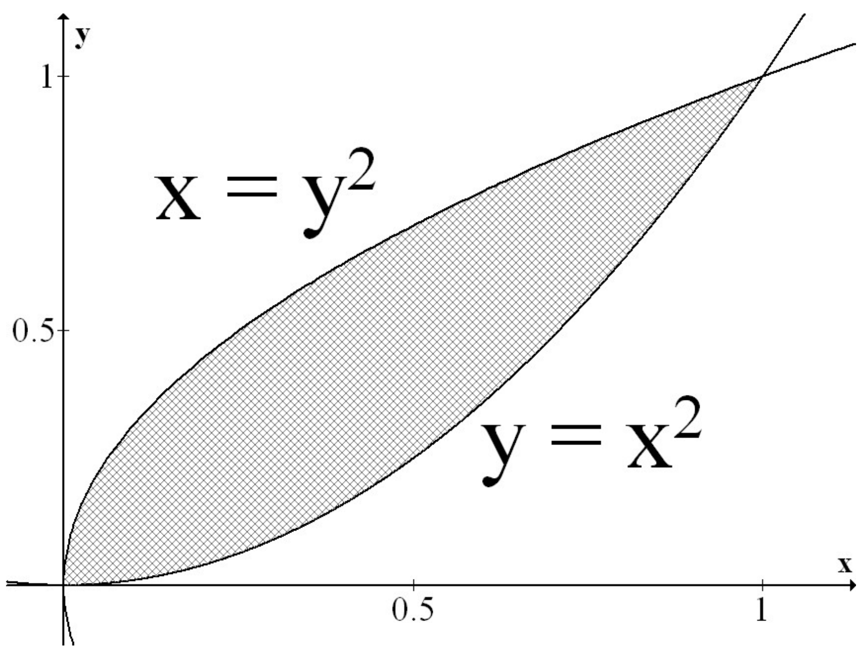
Set up an integral for the total positive area of the following regions:







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



y
1
x = y²
0.5
y = x²
x
0.5
1