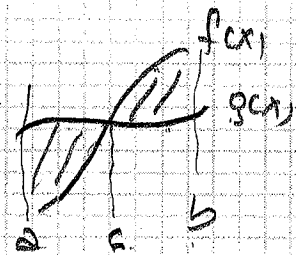
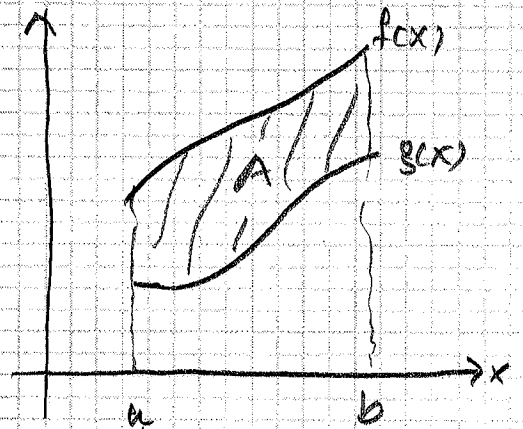


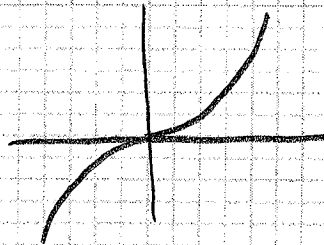
AREA BETWEEN TWO CURVES

If f and g are continuous functions on the interval $[a, b]$ and if $f(x) \geq g(x)$ for all x in $[a, b]$ then

$$A = \int_a^b [f(x) - g(x)] dx$$



Example: Calculate the area of the region bounded by the curves $y = x^2$ and $y = x^3$



$$a \cdot b = 0 \Rightarrow \begin{matrix} a=0 \\ \text{or} \\ b=0 \end{matrix}$$

$$x^2 = x^3 \Rightarrow x^2 - x^3 = 0 \Rightarrow x^2(1-x) = 0 \Rightarrow$$

$$\Rightarrow x^2 = 0 \Rightarrow x = 0 \Rightarrow y = 0 \quad (0, 0)$$

$$1-x = 0 \Rightarrow 1 = x \Rightarrow y = 1 \quad (1, 1)$$

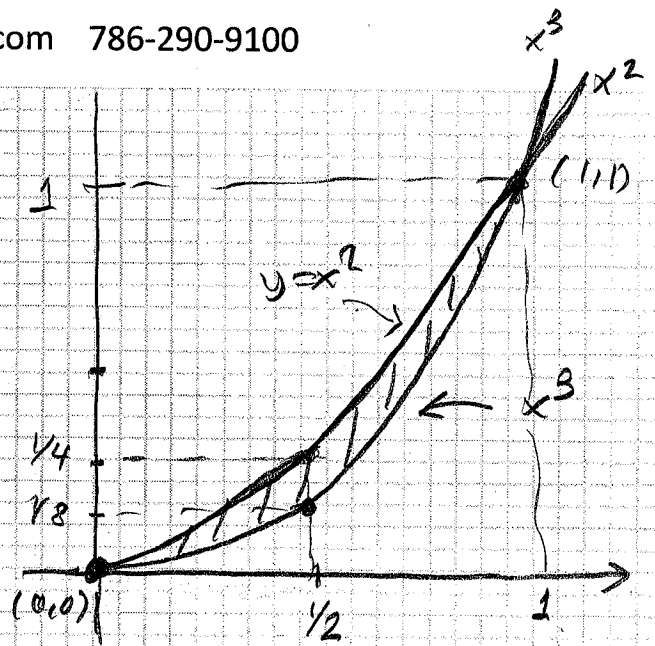
$$y = x^2$$

$$x = 1/2 \quad y = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$y = x^3$$

$$x = 1/2 \quad y = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C$$



$$A = \int_0^1 [x^2 - x^3] dx = \left[\frac{x^3}{3} - \frac{x^4}{4} \right]_0^1$$

$$= \frac{1^3}{3} - \frac{1^4}{4} - \left(\frac{0^3}{3} - \frac{0^4}{4} \right) = \frac{1}{3} - \frac{1}{4} = \frac{1}{12}$$