

Name: \_\_\_\_\_

# Notesheet. Section 6.6+7.1: Area between two curves and Integration by parts

Math 1220

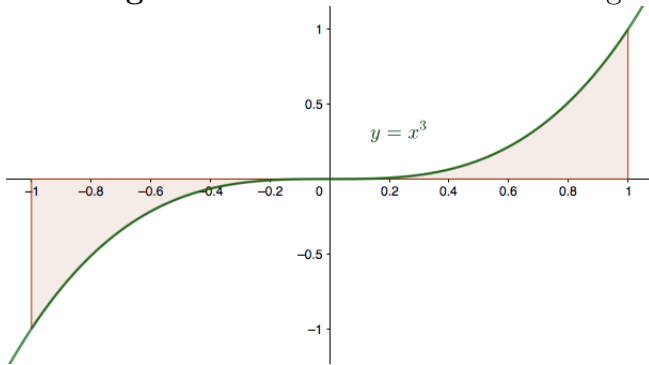
**Theorem 1.** If  $f(x) \geq g(x)$  on  $[a, b]$ , the area of the region between  $f$  and  $g$  on  $[a, b]$  is given by

**Remark 2.** *The general formula is given by  $\int_a^b$*

**Challenge 3.** Find the area of the region bounded above by  $f(x) = x$  and bounded below by  $g(x) = x^2$  on  $[0, 1]$ . Also can be stated “find the area of the region enclosed by  $f(x) = x$  and  $g(x) = x^2$ .”

**Challenge 4.** Find the area of the region enclosed by  $f(x) = 2x - 1$  and  $g(x) = x^2 - 4$ .

**Challenge 5.** Find the area of the following region where the curve is  $y = x^3$ :



**Theorem 6.** Recall the product rule for derivatives.

$$\frac{d}{dx}(f(x) \cdot g(x)) =$$

**Theorem 7.** Given functions  $u = f(x)$  and  $v = g(x)$ , then

$$\int u \, dv =$$

**Challenge 8.** Evaluate the following indefinite integrals

(a)  $\int x e^x \, dx$

(b)  $\int \frac{\ln x}{x^2} \, dx$

(c)  $\int x \cos(x) \, dx$