

## Applying Definite Integration

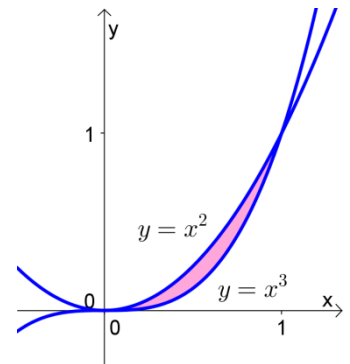
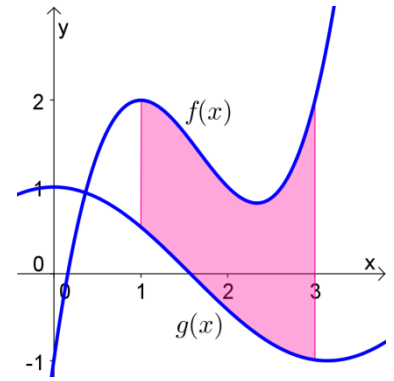
Q: How can we find the area between two curves?

If  $f$  and  $g$  are continuous with  $f(x) \geq g(x)$  on the interval  $a \leq x \leq b$ , then

$$\text{Area between curves} = \int_a^b [f(x) - g(x)] dx$$

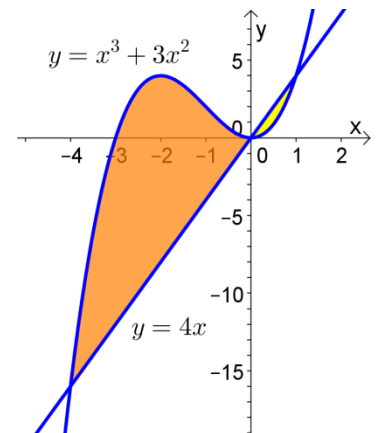
**Ex 1.**

Find the area of the region enclosed by the curves  $y = x^3$  and  $y = x^2$ .



**Ex 2.**

Find the area of the region bounded by the line  $y = 4x$  and the curve  $y = x^3 + 3x^2$ .



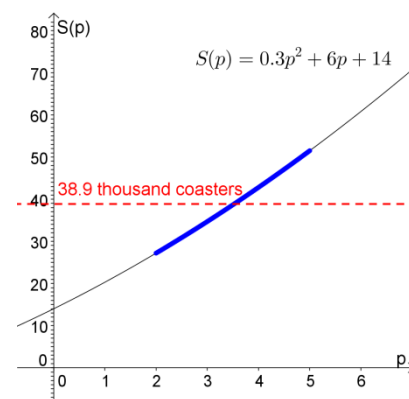
Q: How do we find the average value of a continuous function?

The **average value** of  $f(x)$  over  $a \leq x \leq b$  is:

$$V = \frac{1}{b-a} \int_a^b f(x) dx$$

**Ex 3.**

A manufacturer supplies  $S(p) = 0.3p^2 + 6p + 14$  thousand coasters to the market when the price is  $p$  dollars per coaster. Find the average supply as the price varies from  $p = \$2$  to  $p = \$5$ .



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**Practice**

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1. Find the area of the region bounded by the curve  $y = x^3$  and  $y = 9x$ , for  $x \geq 0$ .

Q: When can you add two to eleven and get one as the correct answer?