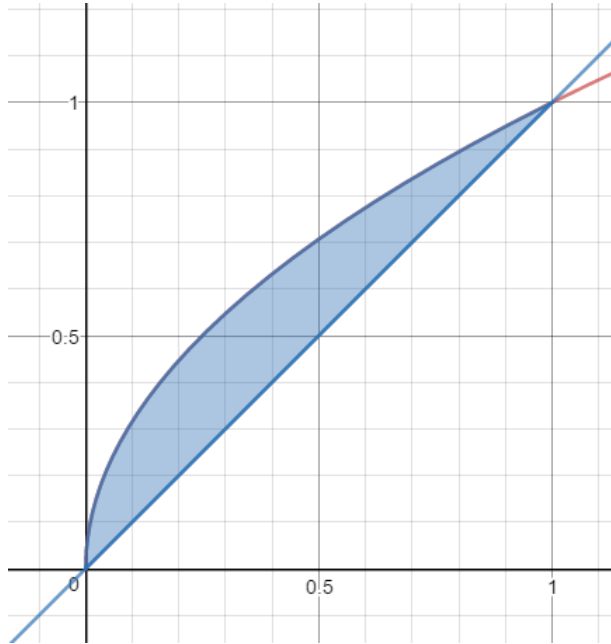


# Integral Calculus lesson 8 - Area bounded by 2 curves pt2

Magic Monk Tutorials

**1 Evaluate the following using the method in Integration Lesson 8 and notice how much easier the questions are.**

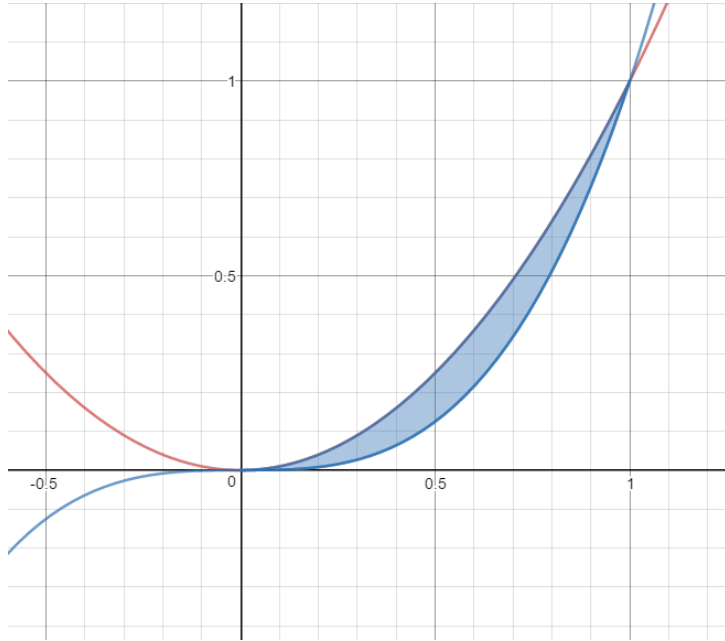
**1.1 The shaded area between the curves  $y = \sqrt{x}$  (in red) and  $y = x$  (in blue)**



Solve intercepts.  $\sqrt{x} = x$  at  $x = 0$  and  $1$ . Write the Area in integral form, where  $y = \sqrt{x}$  is the top function in the bounds.

$$\text{Area} = \int_0^1 \sqrt{x} - x \, dx = \left[ \frac{2}{3}x^{\frac{3}{2}} - \frac{x^2}{2} \right]_0^1 = \frac{2}{3} - \frac{1}{2} = \frac{1}{6} \text{ units squared.}$$

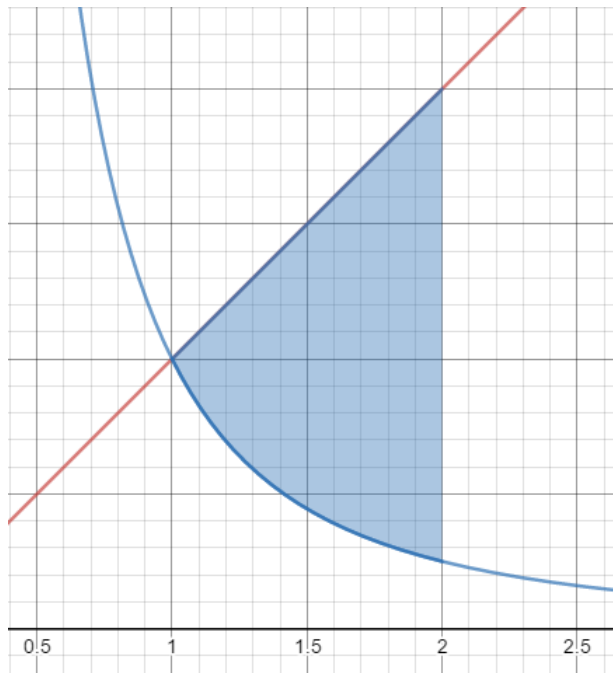
**1.2 The shaded area between the curves  $y = x^2$  (in red) and  $y = x^3$  (in blue)**



Solve intercepts.  $x^2 = x^3$  at  $x = 0$  and 1. Write the Area in integral form, where  $y = x^2$  is the top function in the bounds.

$$\text{Area} = \int_0^1 x^2 - x^3 dx = \left[ \frac{x^3}{3} - \frac{x^4}{4} \right]_0^1 = \frac{1}{3} - \frac{1}{4} = \frac{1}{12} \text{ units squared.}$$

**1.3 The shaded area between the curves  $y = x$  (in red) and  $y = \frac{1}{x^2}$  (in blue) between  $x=1$  and 2**

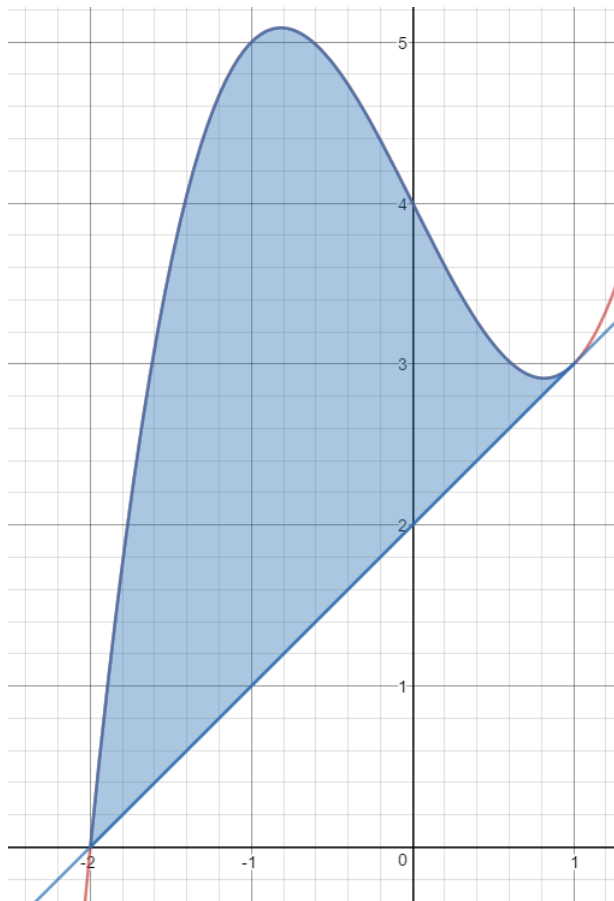


We are told the bounds are  $x = 1$  and 2. Write the Area in integral form, where  $y = x$  is the top function in the bounds.

$$\text{Area} = \int_1^2 x - x^{-2} dx = \left[ \frac{x^2}{2} - \frac{x^{-1}}{-1} \right]_1^2 = \left[ \frac{4}{2} - \frac{2^{-1}}{-1} \right] - \left[ \frac{1}{2} - \frac{1^{-1}}{-1} \right] = \frac{5}{2} - \frac{3}{2} = 1 \text{ units}$$

squared.

**1.4 The shaded area between the curves  $y = x^3 - 2x + 4$  (in red) and  $y = x + 2$  (in blue)**



From looking at the graph, the intersects are  $x = -2$  and  $1$ . Write the Area in integral form, where  $y = x^3 - 2x + 4$  is the top function in the bounds.

$$\begin{aligned} \text{Area} &= \int_{-2}^1 x^3 - 2x + 4 - x - 2 \, dx = \int_{-2}^1 x^3 - 3x + 2 \, dx = \left[ \frac{x^4}{4} - \frac{3x^2}{2} + 2x \right]_{-2}^1 = \left[ \frac{1}{4} - \frac{3}{2} + 2 \right] - \\ &\left[ \frac{(-2)^4}{4} - \frac{3 \cdot (-2)^2}{2} + 2(-2) \right] = \frac{1}{4} - \frac{3}{2} + 2 - 4 + 6 + 4 = \frac{27}{4} \text{ units squared.} \end{aligned}$$