Length of a curve segment
Previously we have learned that one application of an integral is that the length of a curve segment between tow points $(a, f(a))$ and $(b, f(b))$ is given by

$$L = \int_a^b \sqrt{1 + [f'(x)]^2}\,dx$$

Area between two curves
Look at the figure below and write down an integral which represents the value of the shaded area A. The area A represents the area between two curves, $f(x) = x^{\sqrt{5}}$ and $g(x) = \dfrac{2x}{1 + x^2}$

Compute the value of A by evaluating the definite integral:

So, in general the area between two curves $f(x)$ and $g(x)$, with $f(x) > g(x)$ on $[a, b]$ is given by:

Average value of a function
What is the average value of the natural log function between 1 and 4?
You should be able to write down an integral which represents this number and answer the question by evaluating this integral.

The average value, $\bar{f}$, of a function $f(x)$ on some interval $a \leq xleb$ on which it varies continuously is given by the integral: