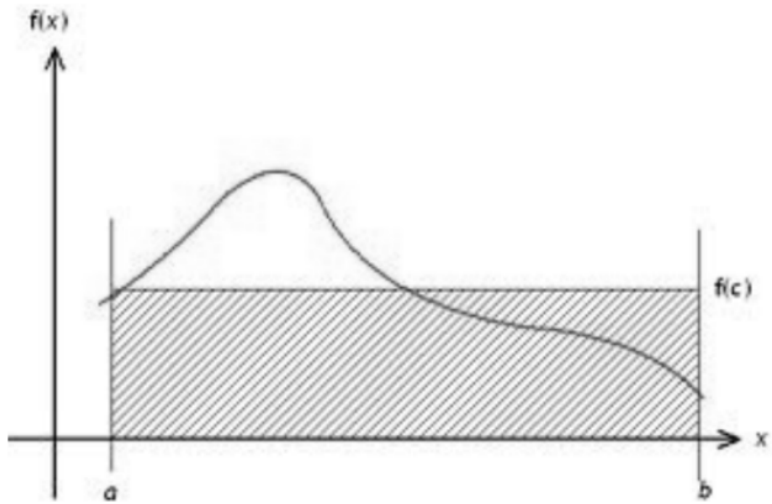


Kindly do on a 1/2 sheet of paper and turn in. With your name on it. Alright.

A spring has a natural length of 20 cm. If a 25-N force is required to keep it stretched to a length of 30 cm, how much work is required to stretch it from 20cm to 25 cm.

6.5 Average Value of a Function

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



The Mean Value Theorem for Integrals

If f is continuous on $[a, b]$, then there exists a number c in $[a, b]$ such that

$$f(c) = f_{\text{ave}} = \frac{1}{b-a} \int_a^b f(x) dx$$

or

$$\int_a^b f(x) dx = f(c)(b - a)$$

Ex. Using the function $f(x) = \sqrt{x}$

1. Find the average value of the function on the interval $[0, 4]$

$$f_{\text{ave}} = \frac{1}{4-0} \int_0^4 \sqrt{x} dx$$

$$f_{\text{ave}} = \frac{1}{4} \left[\frac{2}{3} x^{3/2} \right]_0^4$$

$$f_{\text{ave}} = \frac{1}{4} \left(\frac{16}{3} \right) = \boxed{\frac{4}{3}}$$

2. Find c such that $f(c) = f_{\text{ave}}$

$$\sqrt{c} = \frac{4}{3}$$
$$c = \boxed{\frac{16}{9}}$$

