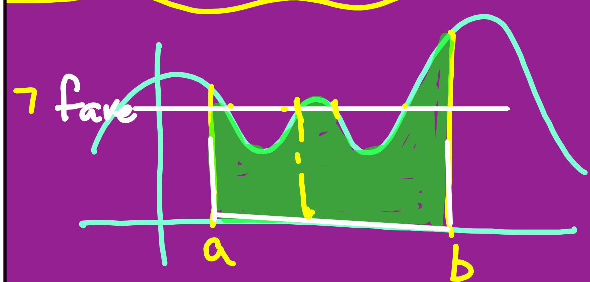
Mean Value Theorem for Integrals

9b

$$\frac{d}{dx}\int_a^{g(x)} f(t)\,dt = f(g(x))\cdot g'(x)$$



$$\int_a^b f(x)\,dx = (b-a)\cdot f_{ave}$$

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

finds y coord of the rectangle which has the same area as the area under the curve

$f(x) = x^2 - 2x + 1 \quad [2, 5]$

Find f_{ave}.

$$f_{ave} = \frac{1}{5-2} \int_2^5 (x^2 - 2x + 1)\,dx$$

$$= \frac{1}{3}\left[\frac{x^3}{3} - \frac{\cancel{2}x^2}{\cancel{2}} + x\right|_2^5$$

$$\frac{1}{3}\left[\frac{125}{3} - 25 + 5 + \left[-\frac{8}{3} + 4 - 2\right]\right]$$

$$\frac{1}{3}\left[\frac{117}{3} - 18\right]$$

$$\frac{1}{3}\left[39 - 18\right]$$

$$\frac{1}{3} \cdot 21$$

$$f = 7$$

Find the x-coord where f_{ave} occurs on f.

$x^2 - 2x + 1 = 7$

$x^2 - 2x - 6 = 0$

$x = \frac{-b \pm \sqrt{}}{} = $

answers must be between 2 + 5.

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