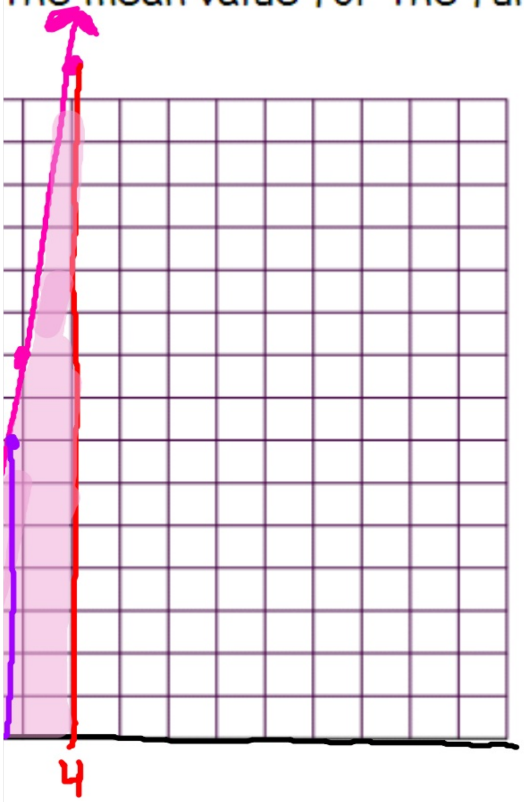
the mean value for the function $f(x) = x^2$ on the interval $[1, 4]$ and whe



$$\int_1^4 x^2 \, dx = F(c)(4-1)$$

$$\frac{1}{3} x^3 \Big|_1^4 = f(c) \cdot 3$$

$F(4) - F(1)$

$21 = f(c) \cdot 3$

$7 = f(c)$ = avg. value

$7 =$

$x =$

$(2.6$

Mean Value Theorem for Integrals

(Average Value Theorem for Integrals)

continuous on the closed interval $[a,b]$, then there is at least one number "c

ıat

$$\int_a^b f(x)\,dx = f(c)\cdot(b-a) \text{ where:}$$

$\int_a^b f(x)\,dx$ is the area under the curve,

$f(c)$ is the mean or average value, and

"c" is the value of "x" where the mean or average value occurs.

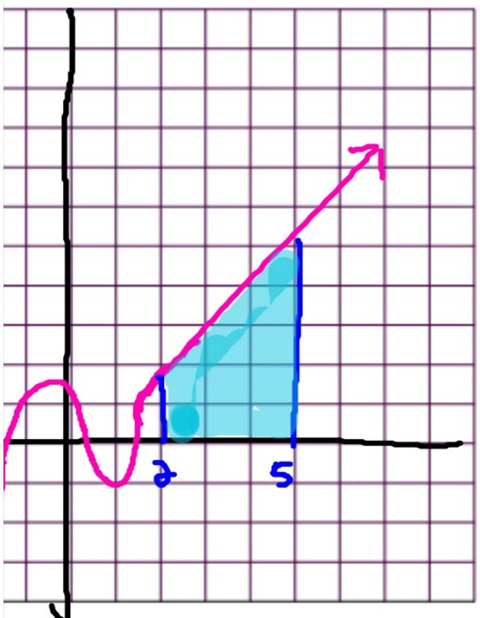
$f(c)\cdot(b-a)$ represents the area of the rectangle.

$f(c)$ is the Mean or Average value (height of the rectangle).

$(b-a)$ is the width of the base of the rectangle.

the average value for the function $f(x)=x\left(x^2-2\right)^{1/3}$ on the interval from x

nd where it occurs.



$u = x^2 - 2$

$du = 2x\,dx$

$$\int_2^5 x(x^2-2)^{1/3}\,dx = f(c)(5-2)$$

$$\int_2^5 \cancel{x}\cdot(u)^{1/3}\,\frac{du}{2\cancel{x}}$$

$$\int_2^5 \frac{1}{2}u^{1/3}\,du = f(c)\cdot 3$$

$$\frac{3}{8}u^{4/3}\Big|_2^{23}$$

$$F(23)-F(2) = f(c)\cdot 3$$

$$23.583 = f(c)\cdot 3$$

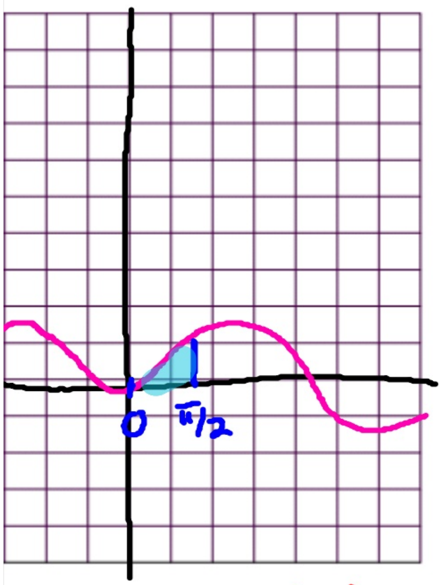
$$7.861 = f(c)$$

$7.861 = x($

$x = 3.5$

$\boxed{(3.566,}$

the mean value for the function $f(x)=\sin^2 x\cos x$ on the interval $[0,\pi/2]$ and where



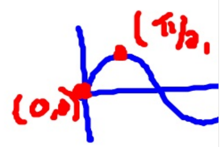
$U=\sin(x)$

$du=\cos(x)\,dx$

$$\int_0^{\pi/2} \sin^2(x)\cdot\cos(x)\,dx = f(c)\cdot(\pi/2-0)$$

$$\int_0^{\pi/2} u^2\cdot\cancel{\cos x}\,\frac{du}{\cancel{\cos x}} = f(c)\cdot\pi/2$$

$$\int_0^{\pi/2} u^2\,du = f(c)\cdot\pi/2$$



$$\frac{1}{3}u^3\Big|_0^1 = f(c)\cdot\pi/2$$

$.212=\sin^2(x)\cdot$

$$\frac{1}{3} = f(c)\cdot\pi/2$$

$(.516, .212)$

$$f(c)=.212$$

$(1.346, .212)$

ate the mean value and where it occurs for the following func

$x) = 3x$ *for* $[1,3]$

5) $f(x) = \sin x$ *for*

$x) = \frac{1}{x^2}$ *for* $[1,3]$

7) $f(x) = \sqrt{x}$ *for*

4

$\int_1^3 3x\,dx = f(c)\cdot 2$

$\frac{3}{2}x^2 \Big|_1^3 = f(c)\cdot 2$

$12 = f(c)\cdot 2$

$6 = f(c)$

$6 = 3x$

$x = 2$

$(2,6)$

5

$\int_0^\pi \sin(x)\,dx = f(c)\cdot \pi$

$-\cos(x)\Big|_0^\pi = f(c)\cdot \pi$

$2 = f(c) = \pi$

$.637 = f(c)$

$.637 = \sin(x)$

$x = .691, 2.451$

$(.691, .637)$

$(2.451, .637)$

$f(x) = \frac{1}{x^2}$ *for* $[1,3]$

$\int_1^3 x^{-2}\,dx = f(c)\cdot 2$

$-1x^{-1}\Big|_1^3 = f(c)\cdot 2$

$2/3 = f(c)\cdot 2$

$f(c) = .333$

$.333 = 1/x^2$

$x = 1.73$

$(1.73, .333)$

7) $f(x) = \sqrt{x}$ *for* $[0,9]$

$\int_0^9 x^{1/2} = f(c)\cdot 9$

$\frac{2}{3}x^{3/2}\Big|_0^9 = f(c)\cdot 9$

$18 = f(c)\cdot 9$

$2 = f(c)$

$2 = \sqrt{x}$

$x = 4$

$(4, 2)$