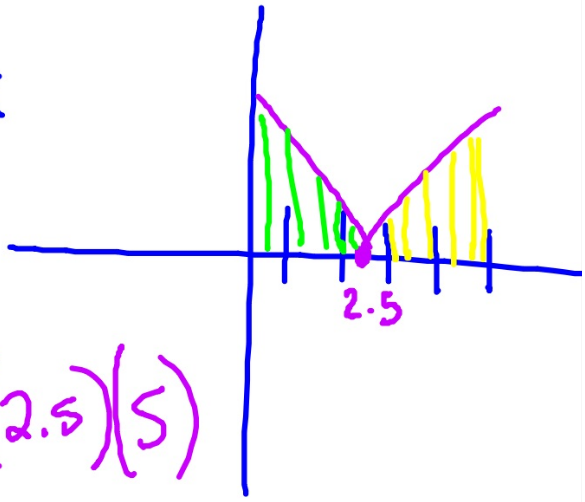
23) $\displaystyle\int_0^5 |2x-5|\,dx$

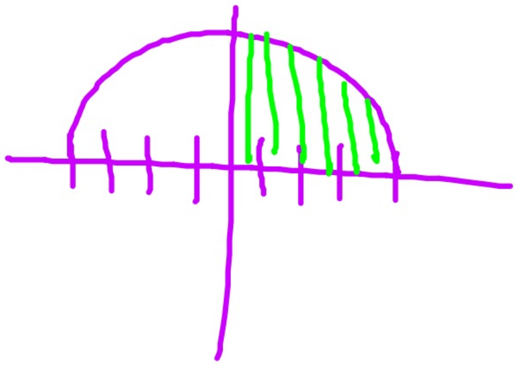



$$\frac{1}{2}(2.5)(5)+\frac{1}{2}(2.5)(5)$$

$$2\cdot\frac{1}{2}\left(\frac{5}{2}\cdot 5\right)$$

$$\frac{25}{2}$$

$$\int_0^4 \sqrt{16-x^2}\,dx$$



$$\frac{1}{4}\pi(4)^2$$

$$4\pi$$

1st F.T.C.

Average Value

Area under a curve

2nd F.T.C.

**THEOREM 4.11 THE SECOND FUNDAMENTAL THEOREM OF CALCULUS**

If $f$ is continuous on an open interval $I$ containing $a$, then, for every $x$ in the interval,

$$\frac{d}{dx}\left[\int_a^x f(t)\,dt\right] = f(x).$$

#1 FIND F(X) AND F'(X)

. $F(x) = \int_0^x \sin\theta\, d\theta$

$F'(x) = \sin x$

$F(x) = -\cos\theta \Big|_0^x$

$= -\cos x - (-\cos 0)$

$F(x) = -\cos x + 1$

#2 $F(x) = \int_0^x (4t - 7)\, dt$

$F'(x) = 4x - 7$

$F(x) = 2t^2 - 7t \Big|_0^x$

$F(x) = 2x^2 - 7x$

$\boxed{F'(x) = 4x - 7}$

③ $F(x) = \int_1^{x^3} t^2\,dt$

$F(x) = \frac{1}{3}t^3 \Big|_1^{x^3}$

$F(x) = \frac{1}{3}x^9 - \frac{1}{3}$

$F'(x) = 3x^8$

$F'(x) = x^6 \cdot 3x^2$

$F'(x) = 3x^8$

:)

$$F(\theta) = \int_{1}^{\sin\theta} \sqrt{t^2+6}\, dt$$

$\sqrt{x^2-1} \neq x-1$

$$F'(\theta) = \sqrt{\sin^2\theta + 6} \cdot \cos\theta$$

$$F'\left(\frac{\pi}{6}\right) = \sqrt{\frac{1}{4}+6} \cdot \frac{\sqrt{3}}{2}$$

$$= \frac{\sqrt{25}}{\sqrt{4}} \cdot \frac{\sqrt{3}}{2} = \frac{5\sqrt{3}}{4}$$

$$F(x) = \int_{2}^{2x^2} (1-t)^7 \, dt$$

$$F'(x) = (1-2x^2)^7 \cdot 4x$$

$$F'(1) = (1-2)^7 \cdot 4(1)$$

$$= -4$$