<u>Global min :</u>

$a > 0$ at $x = 0$, $f(0) = 0$

$a < 0$ Compare

$x = \pm 1$, $x = \pm\sqrt{\frac{-a}{2}}$

If $a < -2$, there ~~is~~ are no ~~only~~ local mins in $(-1, 1)$ with $f'(x) = 0$.

$a < -2 \Rightarrow \pm 1$ are global mins

$f(\pm 1) = \cancel{4 + 2a}$ $1 + a$

$a \geq -2$, $a < 0$

Compare endpts $x = \pm 1$

$x = \pm\sqrt{-\frac{a}{2}}$

$f(\pm 1) = 1 + a$ $\quad f\left(\pm\sqrt{\frac{-a}{2}}\right)$

$= \frac{a^2}{4} + a\left(\frac{-a}{2}\right) = -\frac{a^2}{4}$

8/24
1

$$\int_0^1 (x^2 - \pi)\, dx$$

$$= \left[\frac{1}{3} x^3 - \pi x \right]_0^1$$

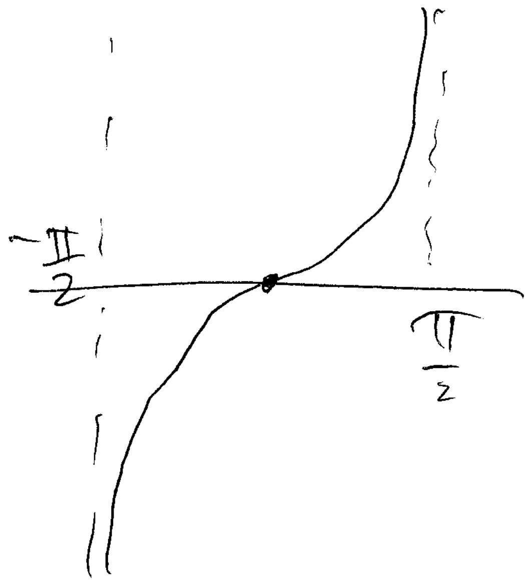
$$= \frac{1}{3} 1^3 - \pi \cdot 1 = \frac{1}{3} - \pi$$

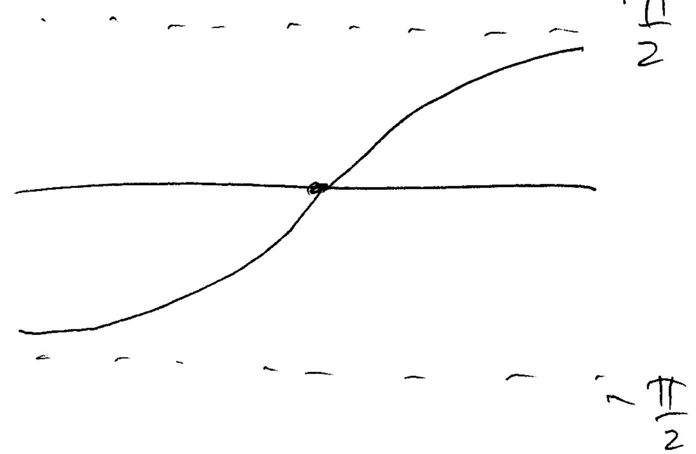
$$\int_0^1 \frac{1}{1+x^2}\, dx = \tan^{-1} x \Big|_0^1$$

$$= \tan^{-1}(1) - \tan^{-1}(0)$$

$$= \frac{\pi}{4} - 0 = \frac{\pi}{4}$$

8 | 24
2





$\tan x$ $\tan^{-1} x$

$$\frac{d}{dx} \int_a^x f(x)\, dx$$

dummy varrable

$\boxed{\begin{matrix}8/24 \\ 3\end{matrix}}$

(1) $$\frac{d}{dx} \int_0^x \sin u \, du$$

Brute force:

$$= \frac{d}{dx} \Big[-\cos u \Big]_{u=0}^{u=x}$$

$$= \frac{d}{dx} \Big[-\cos x + \cos 0 \Big]$$

$$= \sin x$$

Better:

$$\sin x$$

(2) $$\frac{d}{dx} \int_2^x \sin(3t^2) \, dt$$

$$= \sin(3x^2)$$