

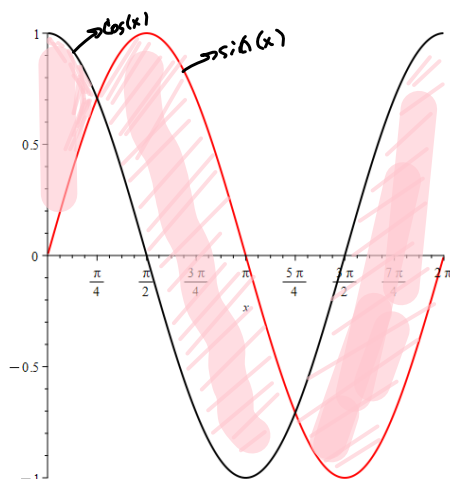
$$g(x) \leq f(x) \text{ on } [a, b] \rightarrow$$

Area between f & g on $[a, b]$ is $\int_a^b (f(x) - g(x)) dx$

In general, it's $\int_a^b |f(x) - g(x)| dx$

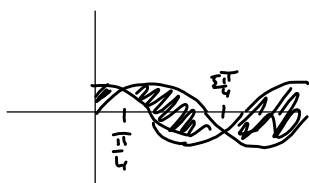
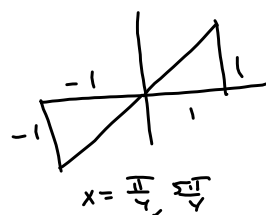
Area between sine & cosine over $[0, 2\pi]$.

$$\text{is } \int_0^{2\pi} |\sin(x) - \cos(x)| dx$$



$$\sin(x) = \cos(x)$$

$$\frac{\sin(x)}{\cos(x)} = \tan(x) = 1$$



$$|f(x) - g(x)| = |\sin(x) - \cos(x)|$$

$$= \begin{cases} -(\sin(x) - \cos(x)) & \text{if } 0 \leq x \leq \frac{\pi}{4} \text{ or } \frac{5\pi}{4} \leq x \leq 2\pi \\ \sin(x) - \cos(x) & \text{if } \frac{\pi}{4} \leq x \leq \frac{5\pi}{4} \end{cases}$$

$$\Rightarrow \text{Area} = \int_0^{\frac{\pi}{4}} (\cos(x) - \sin(x)) dx + \int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} (\sin(x) - \cos(x)) dx + \int_{\frac{5\pi}{4}}^{2\pi} (\cos(x) - \sin(x)) dx$$

$$= \sqrt{2} - 1.$$