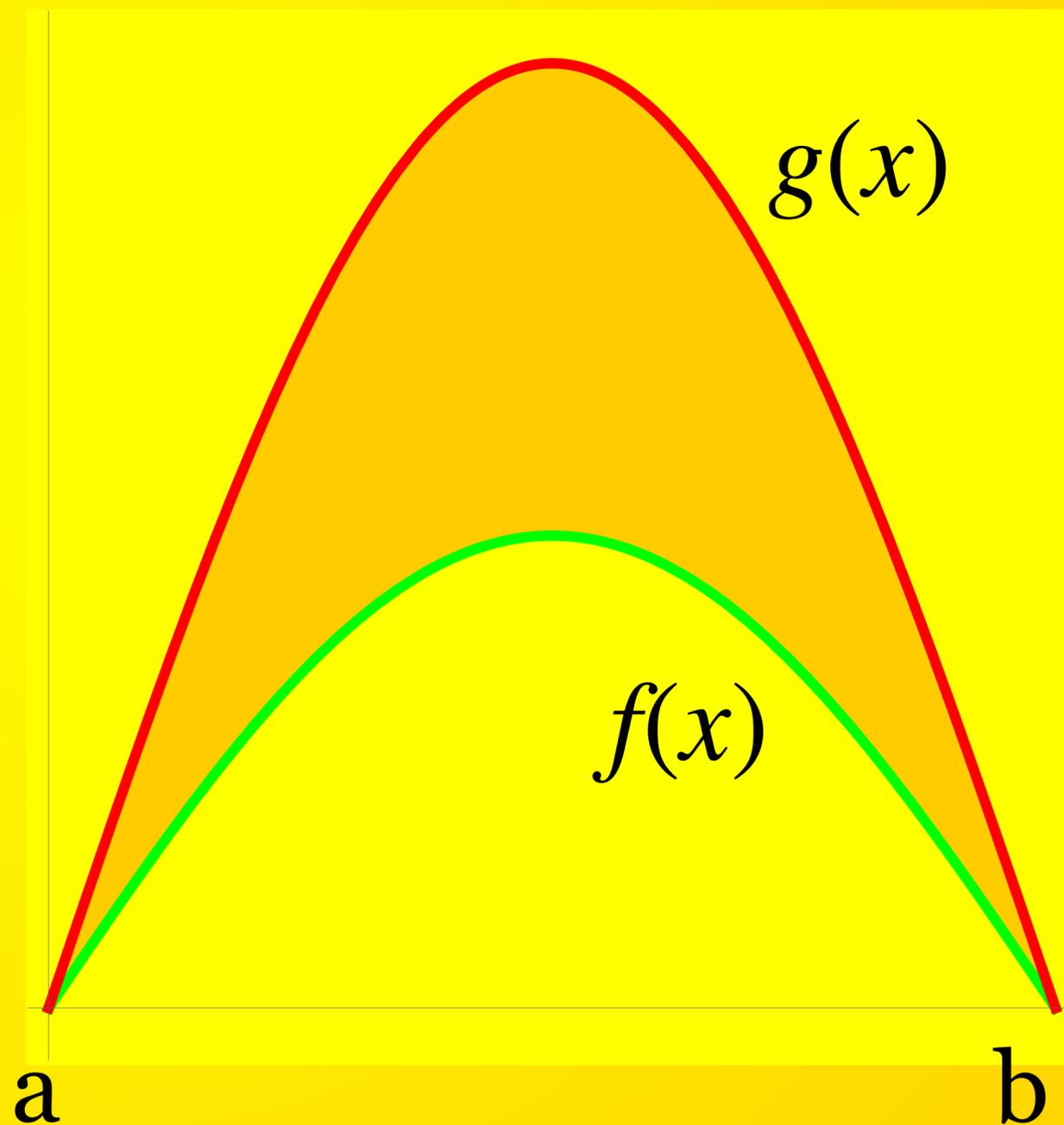


20

Areas

area between two
curves

$$A = \int_a^b g(x) - f(x) dx$$



PLAN

1. Poll

2. Area below curve

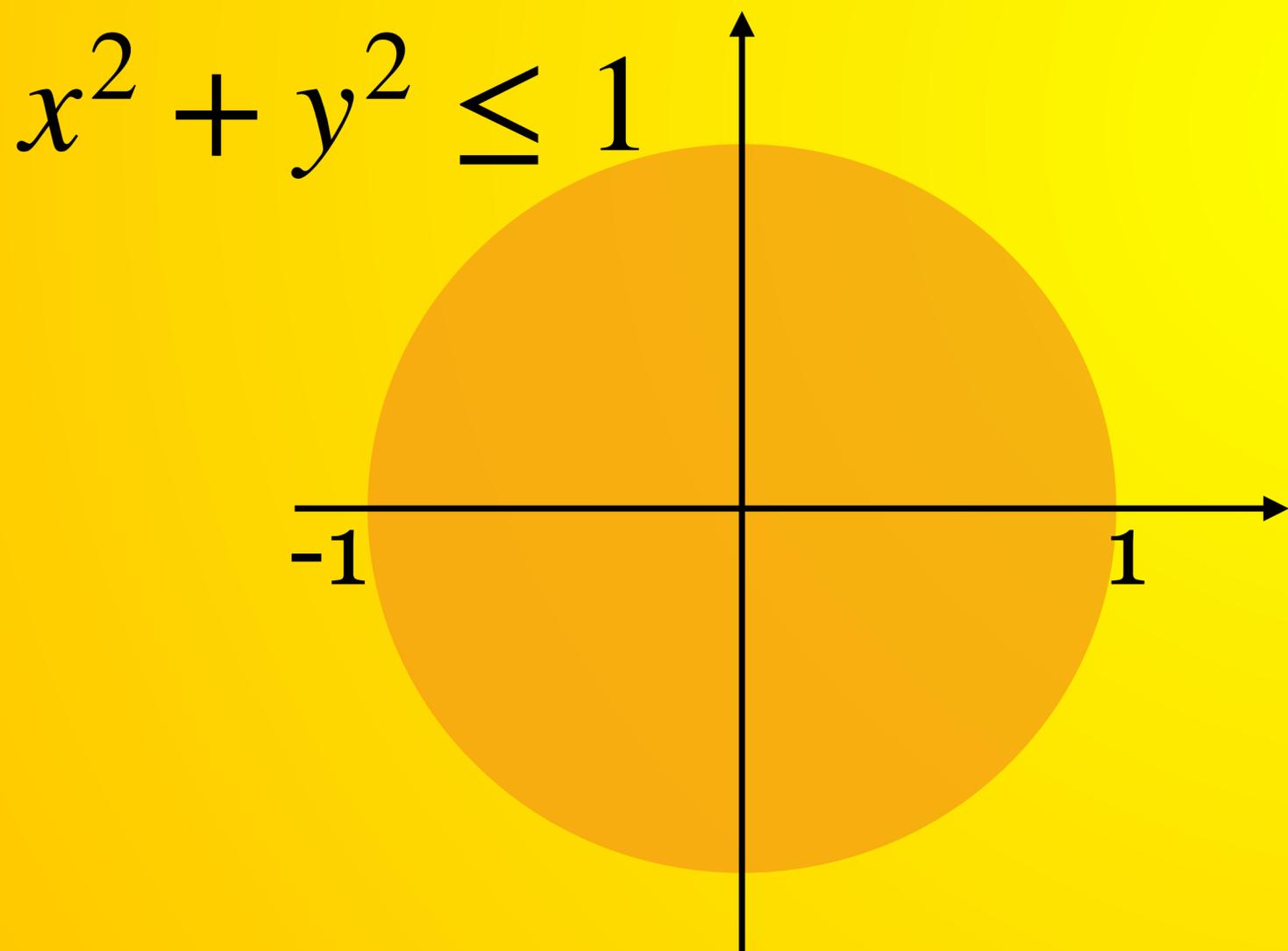
3. Area between curves

4. Examples

5. Jam

POLL

Which one is the area of the unit disk?



A

$$\int_0^1 \sqrt{1-x^2} dx$$

B

$$\int_{-1}^1 \sqrt{1-x^2} dx$$

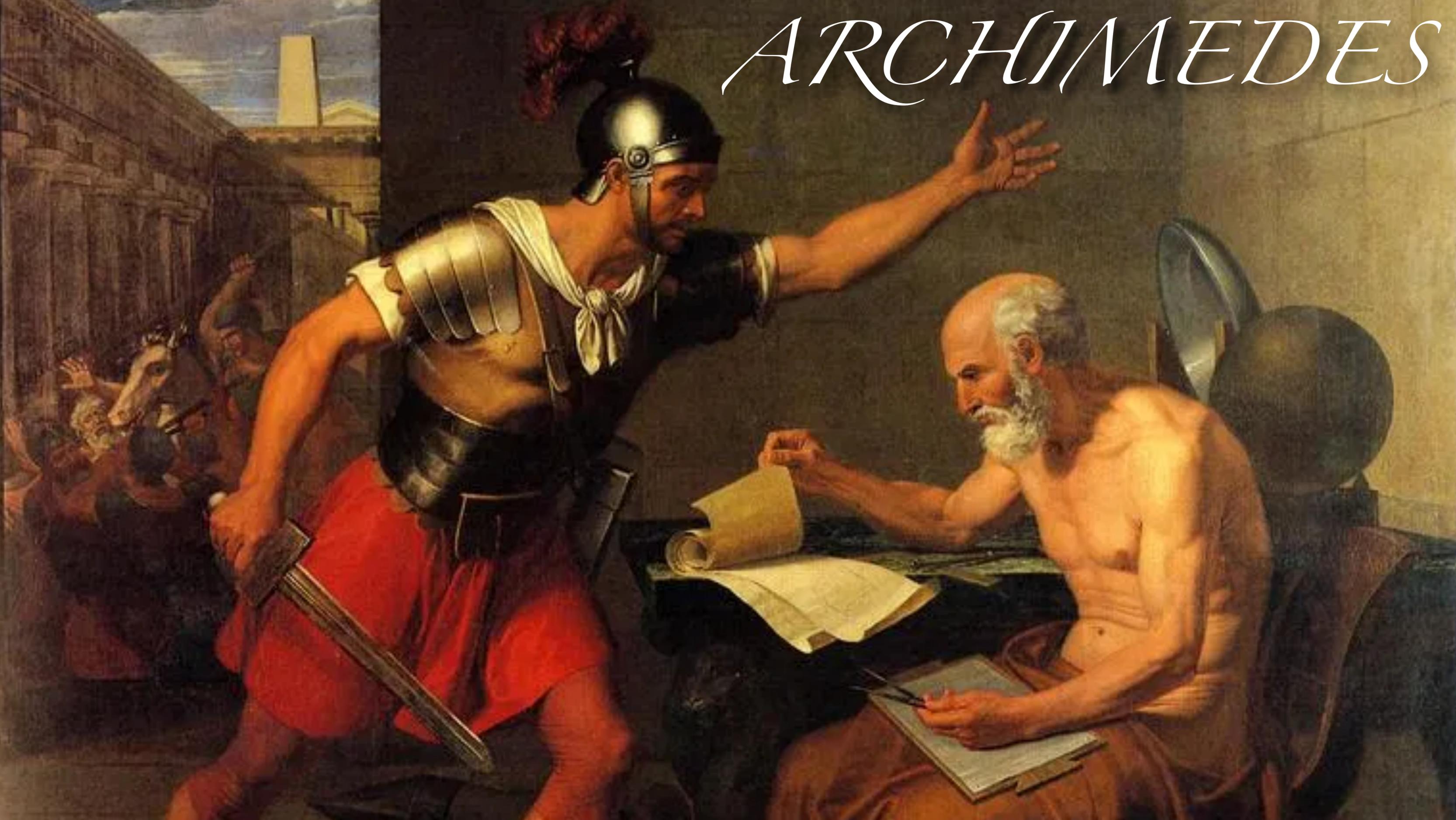
C

$$2 \int_0^1 \sqrt{1-x^2} dx$$

D

$$2 \int_{-1}^1 \sqrt{1-x^2} dx$$

ARCHIMEDES

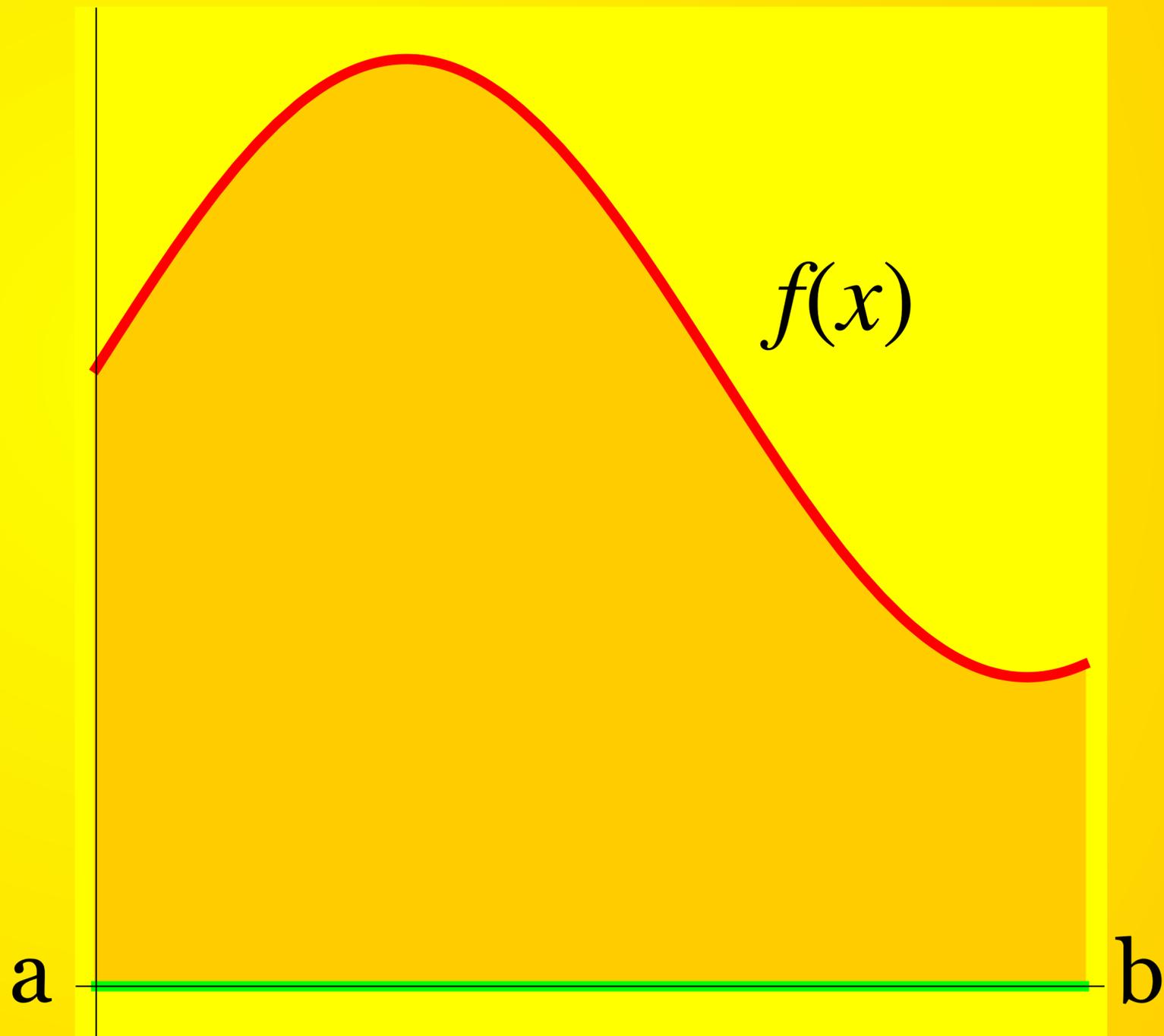




Area under Curve

$$\int_a^b f(x) dx$$

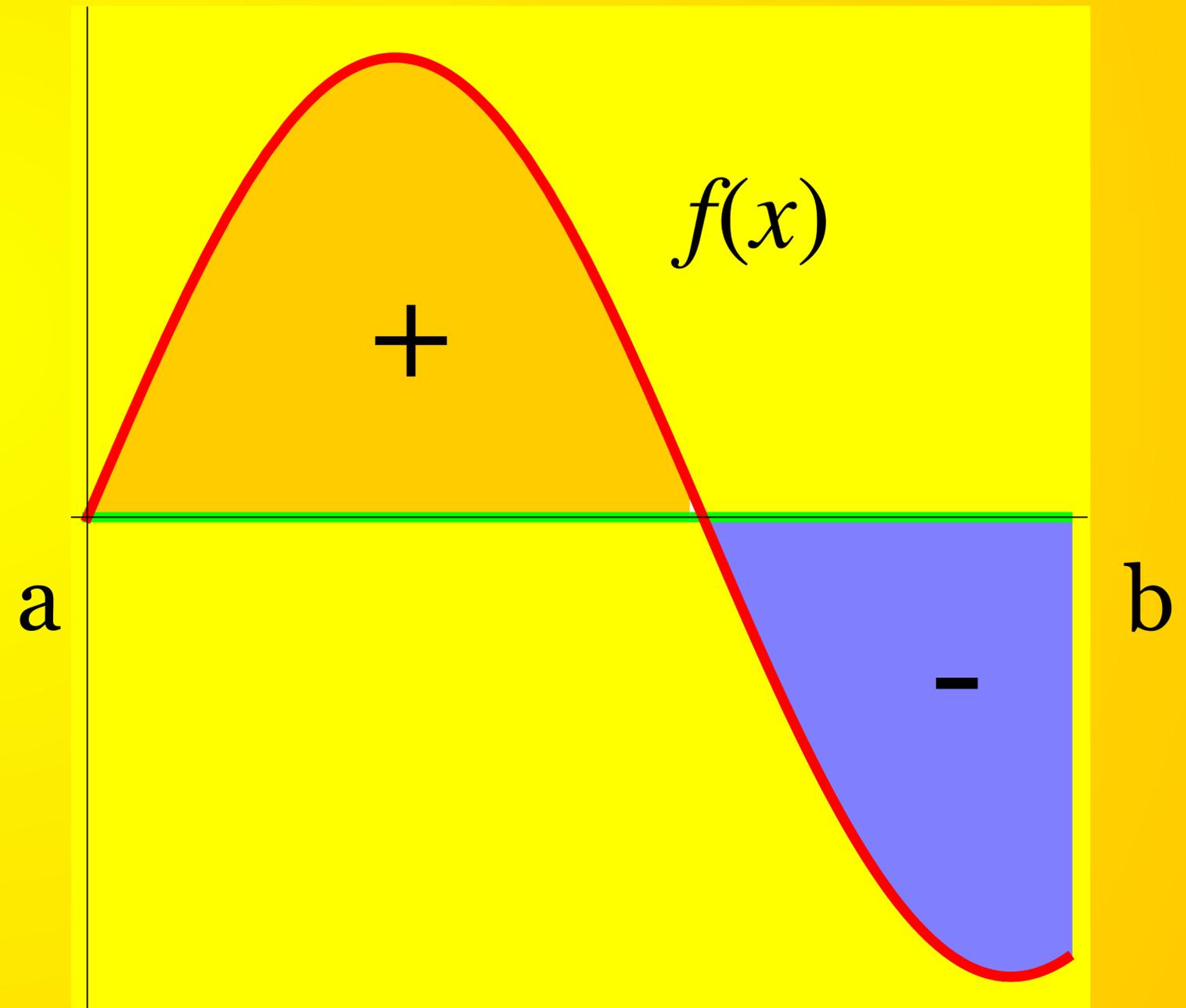
if $f \geq 0$



Signed Area

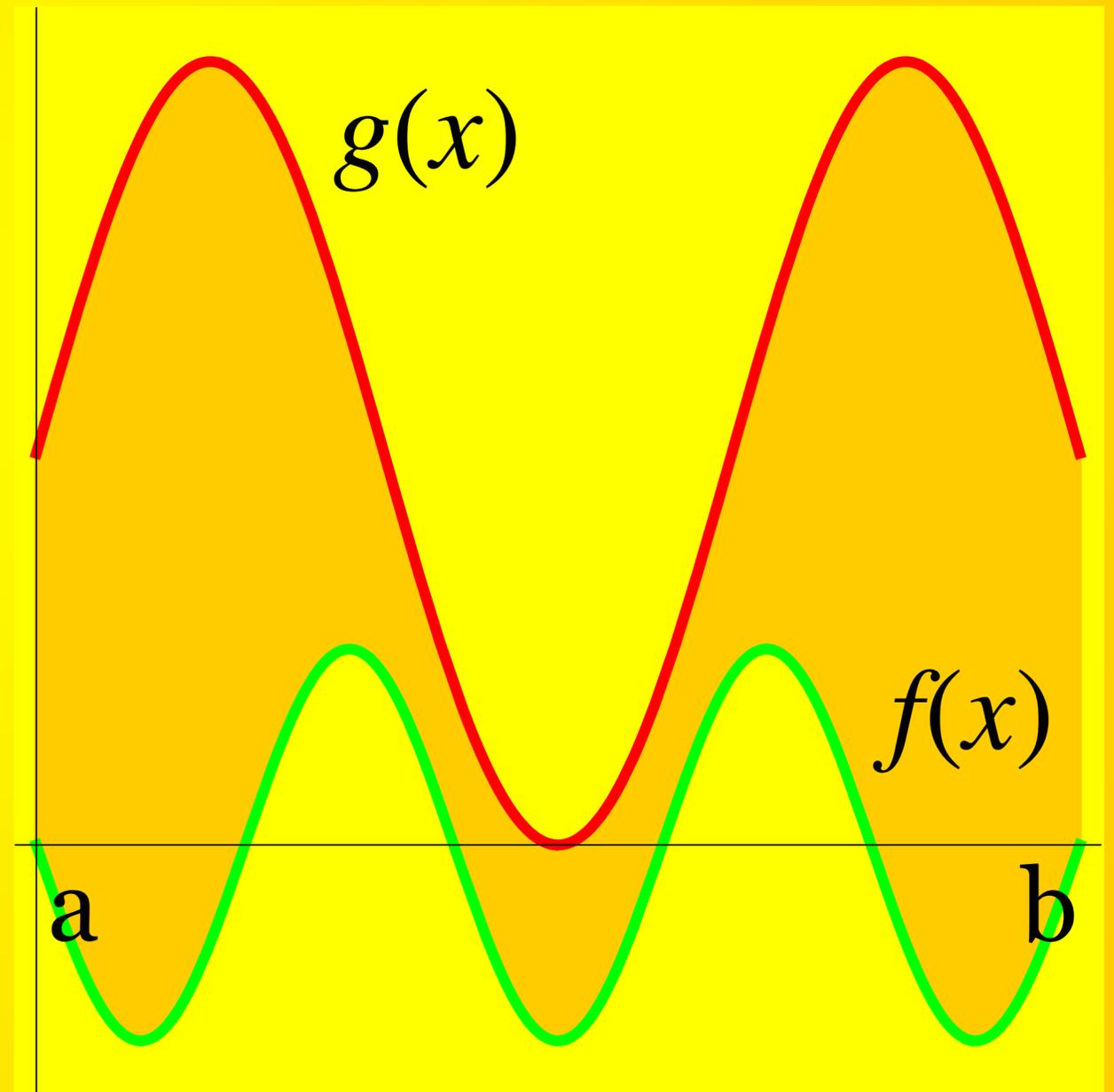
$$\int_a^b f(x) dx$$

in general



Area between curves

$$\int_a^b g(x) - f(x) dx$$



Remember

Anti-derivatives are
integral to your success!

And happiness:

HI DARLING!

USE MY ATM CARD, TAKE ANY
AMOUNT OUT, GO SHOPPING AND
TAKE YOUR FRIENDS FOR LUNCH

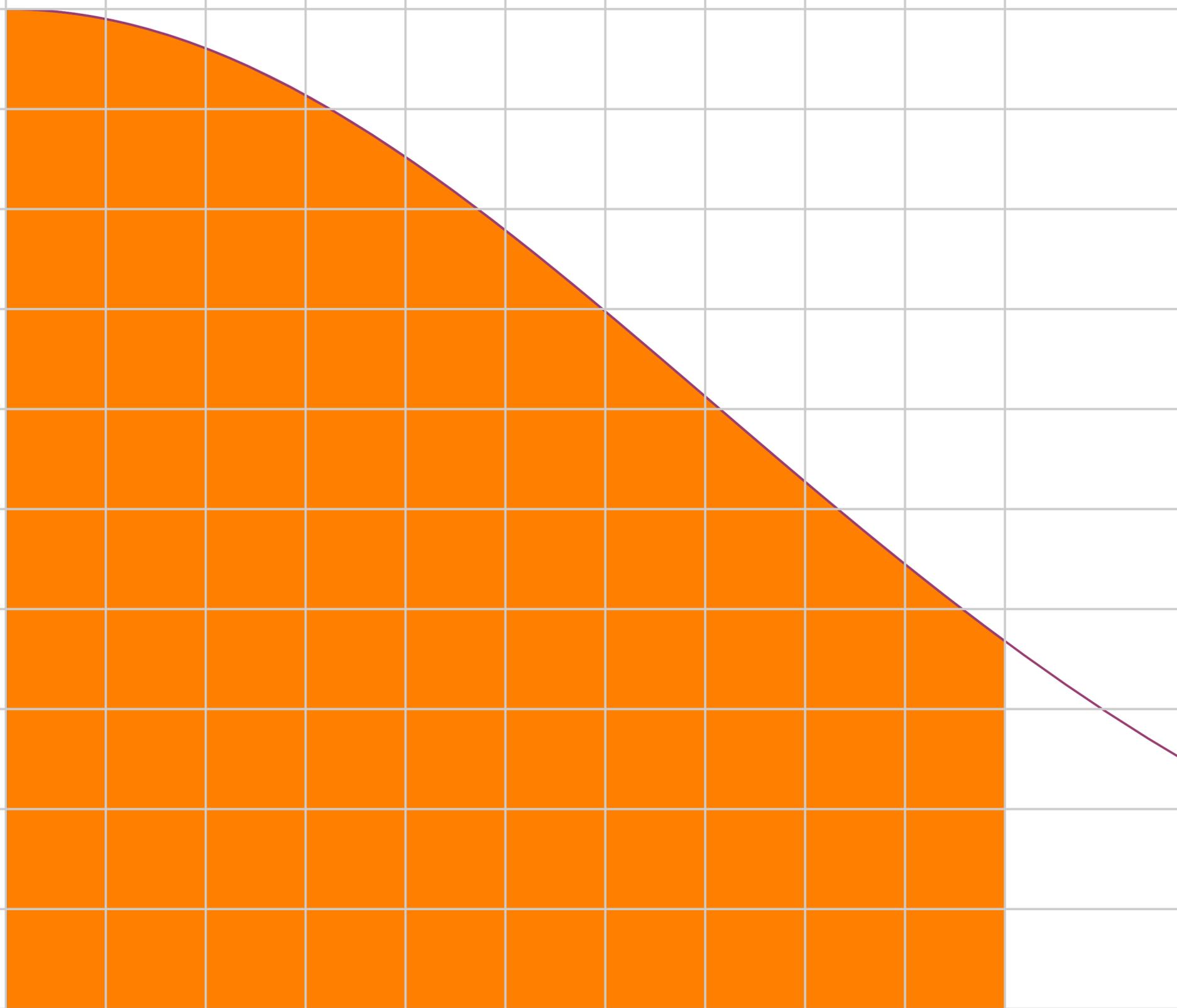
PIN CODE: $\int_0^1 \frac{(3x^3 - x^2 + 2x - 4) dx}{\sqrt{x^2 - 3x + 2}}$

I LOVE YOU HONEY

Source:

<https://mathjokes4mathyfolks>

1



1

Riemann

Sum

can you estimate

$$\int_0^1 e^{-x^2} dx$$



Gauss

alive

reanimated
with deep
Heritage
tool

Problems

Find the
areas
of the
regions!
Make
a picture!

A

$$y = x^6, y = x^2$$

B

$$y = x, y = x^3, x = 0, x = 2$$

C

$$x = y, x = 2y, y = 1$$

What is the result?

Tell the
result
without
integration

A

$$\int_3^{10} 4 \, dx$$

B

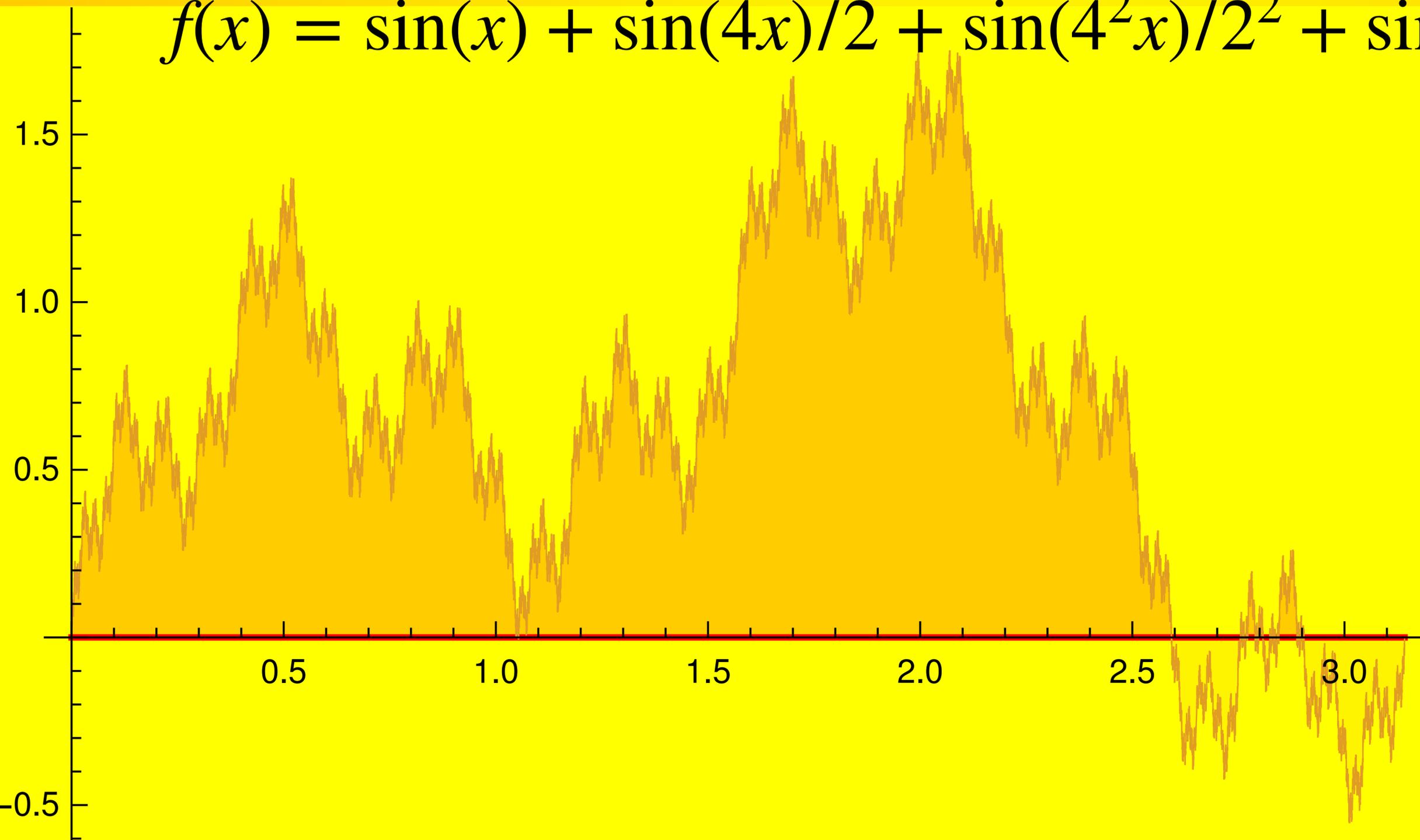
$$\int_0^{10} x \, dx$$

C

$$\int_0^1 \sqrt{1-x^2} \, dx$$

Weierstrass Function

$$f(x) = \sin(x) + \sin(4x)/2 + \sin(4^2x)/2^2 + \sin(4^3x)/2^3 + \dots$$



Can you find

$$\int_0^{\pi} f(x) dx$$

without too
much work?



Jam

A

$$\int_0^2 x^3 dx$$

B

$$\int_0^{\log(10)} e^x dx$$

C

$$\int_0^1 \frac{1}{1+x^2} dx$$

D

$$\int_0^{1/2} \frac{1}{\sqrt{1-x^2}} dx$$

The End