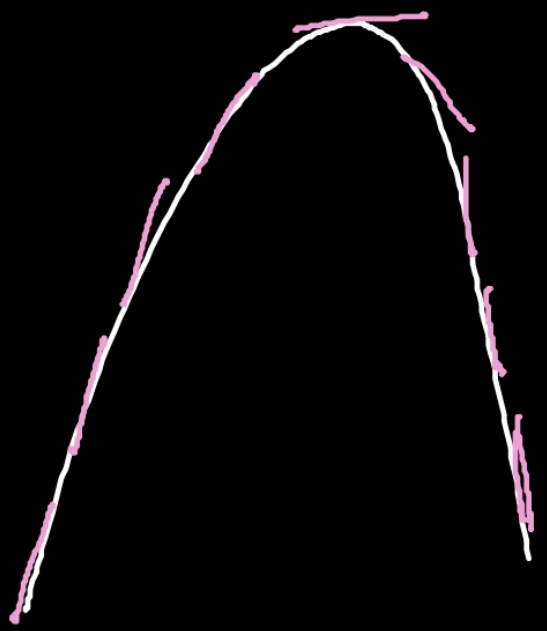
The output of the derivative is the....?

gradient of the tangent

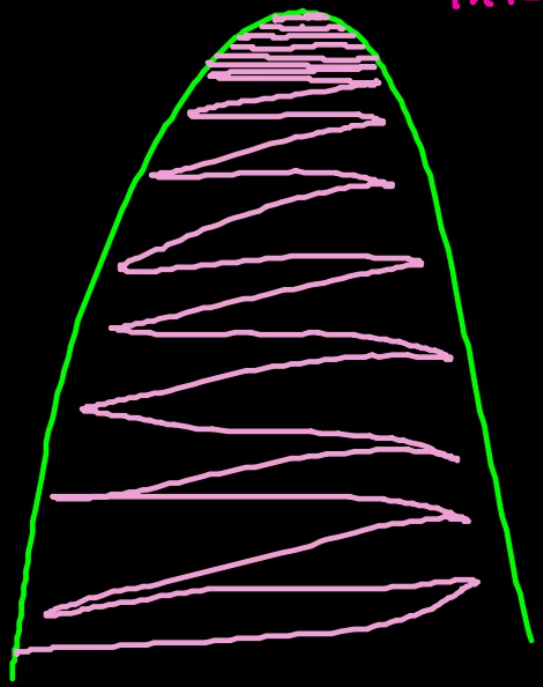


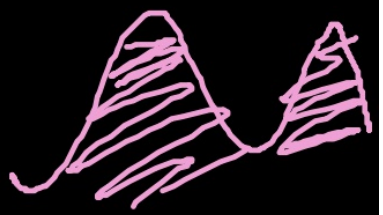
If the output of the derivative is the gradient of the tangent line...

What is the output of the anti-derivative?

area under a curve

integral





Today's learning objective:

By the end of class, I will understand the purpose and method behind calculating an integral as well as a method to approximate integrals via a Riemann Sum.

Today's language objective:

*I will verbalize these vocabulary terms in small groups.

integral

Definite integral; Boundaries; Anti-derivative; Riemann Sum

So how should we connect the rectangules to our function?

Please get a graphing board and plot the function sans calculator:

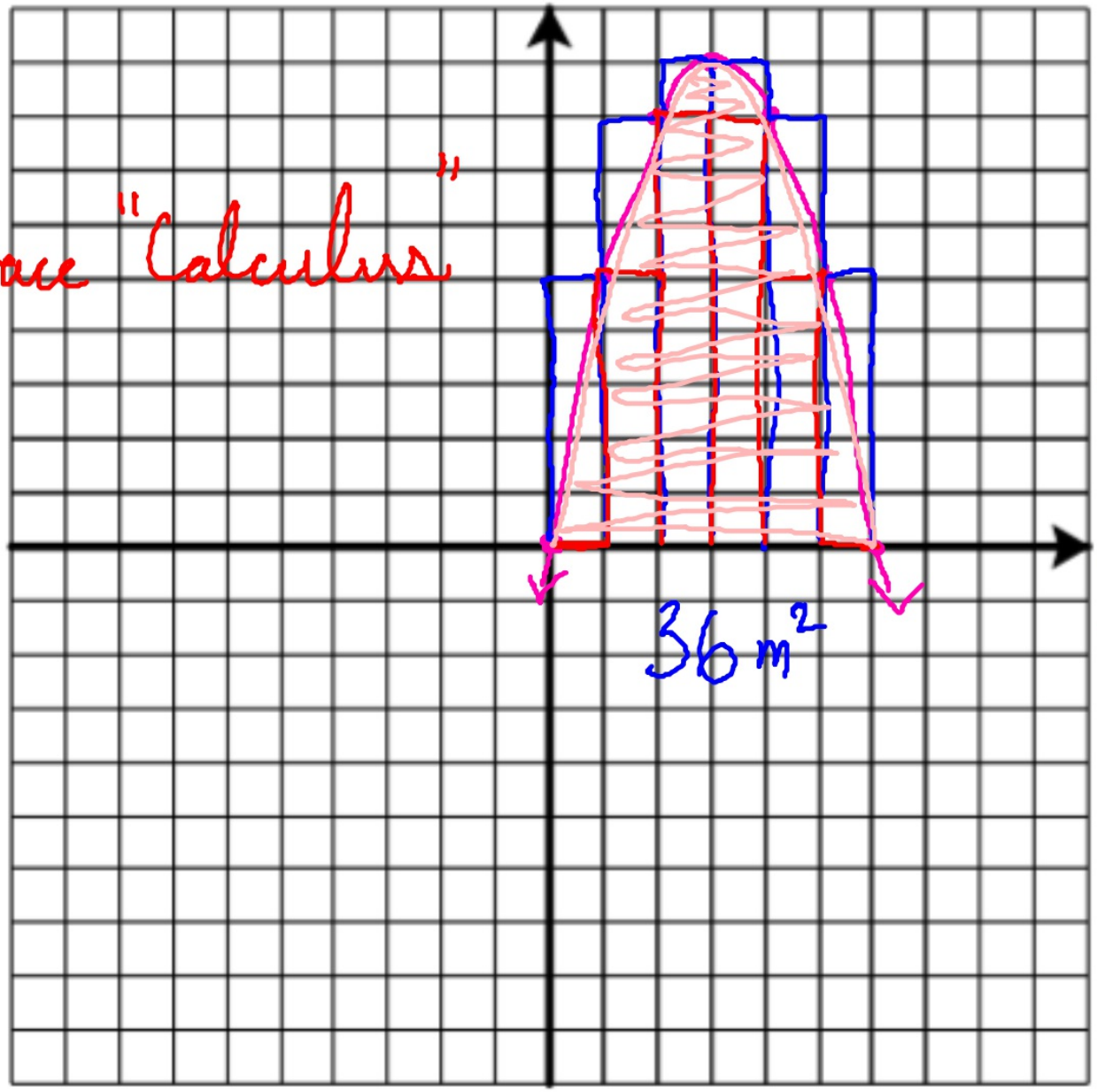
y1=

$f(x) = -(x - 3)^2 + 9$

(1,5) (2,8) (3,9)

Embed rectangles within the function.

Estimate the area.


2nd Trace "Calculus"
∫
44 m² +
26 m² −
35 m² avg.
36 m²
[0,6]

$$-(x-3)^2+9$$

	$x-3$	
x	x^2	$-3x$
-3	$-3x$	9

$$-(x^2-6x+9)+9$$

$$-x^2+6x-9+9$$

$$-x^2+6x^1=f(x)$$

$$\left|\frac{-x^3}{3}+3x^2\right|_0^6 \Longleftarrow \frac{-x^3}{3}+\frac{6x^2}{2}$$

$$\left| \frac{-x^3}{3} + 3x^2 \right|_0^6$$

$$\left[\frac{-(6)^3}{3} + 3(6)^2 \right] - \left[\frac{-(0)^3}{3} + 3(0)^2 \right]$$

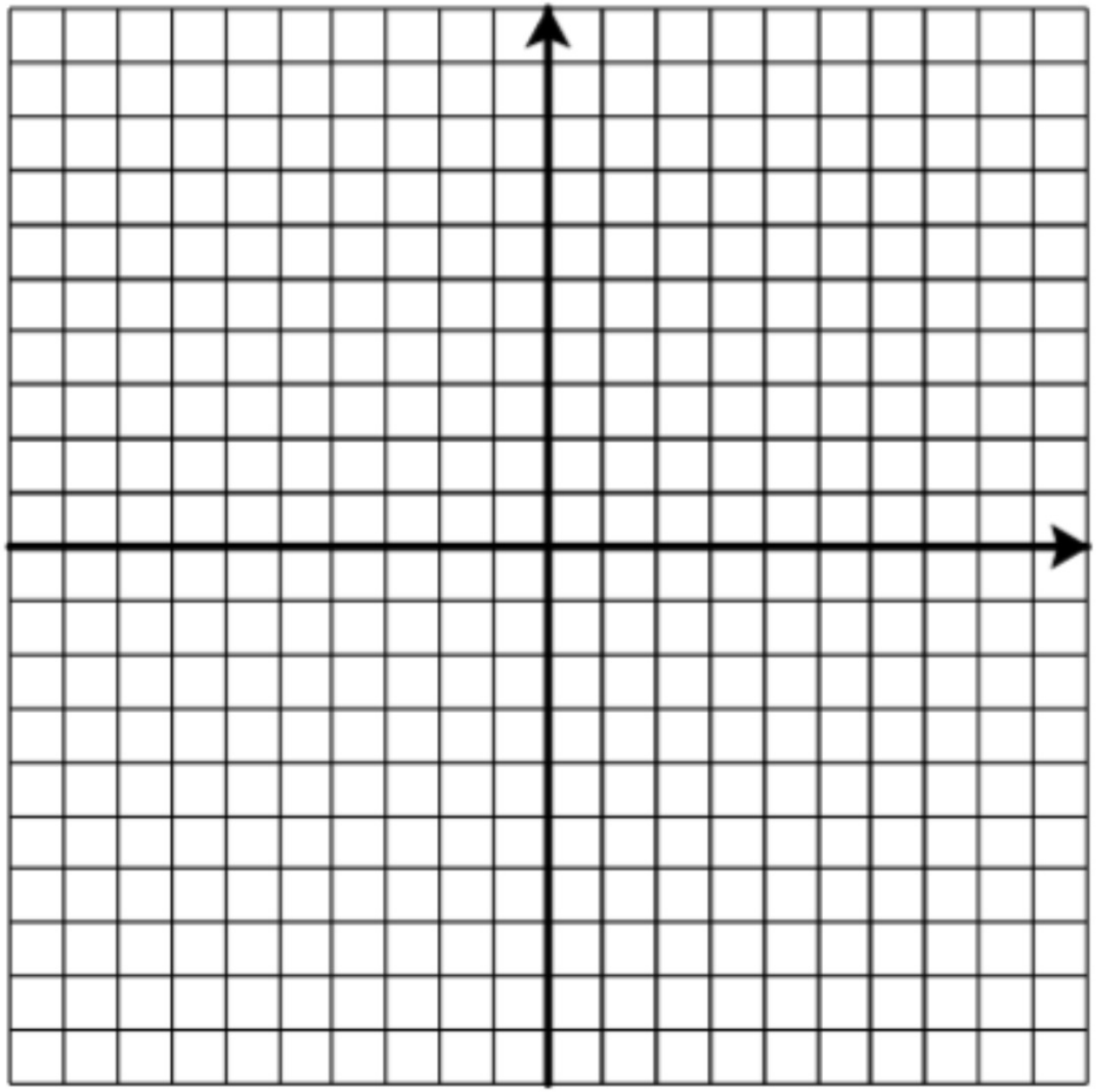
$$36 \qquad 0$$

$$\frac{-216}{3} + 108 =$$

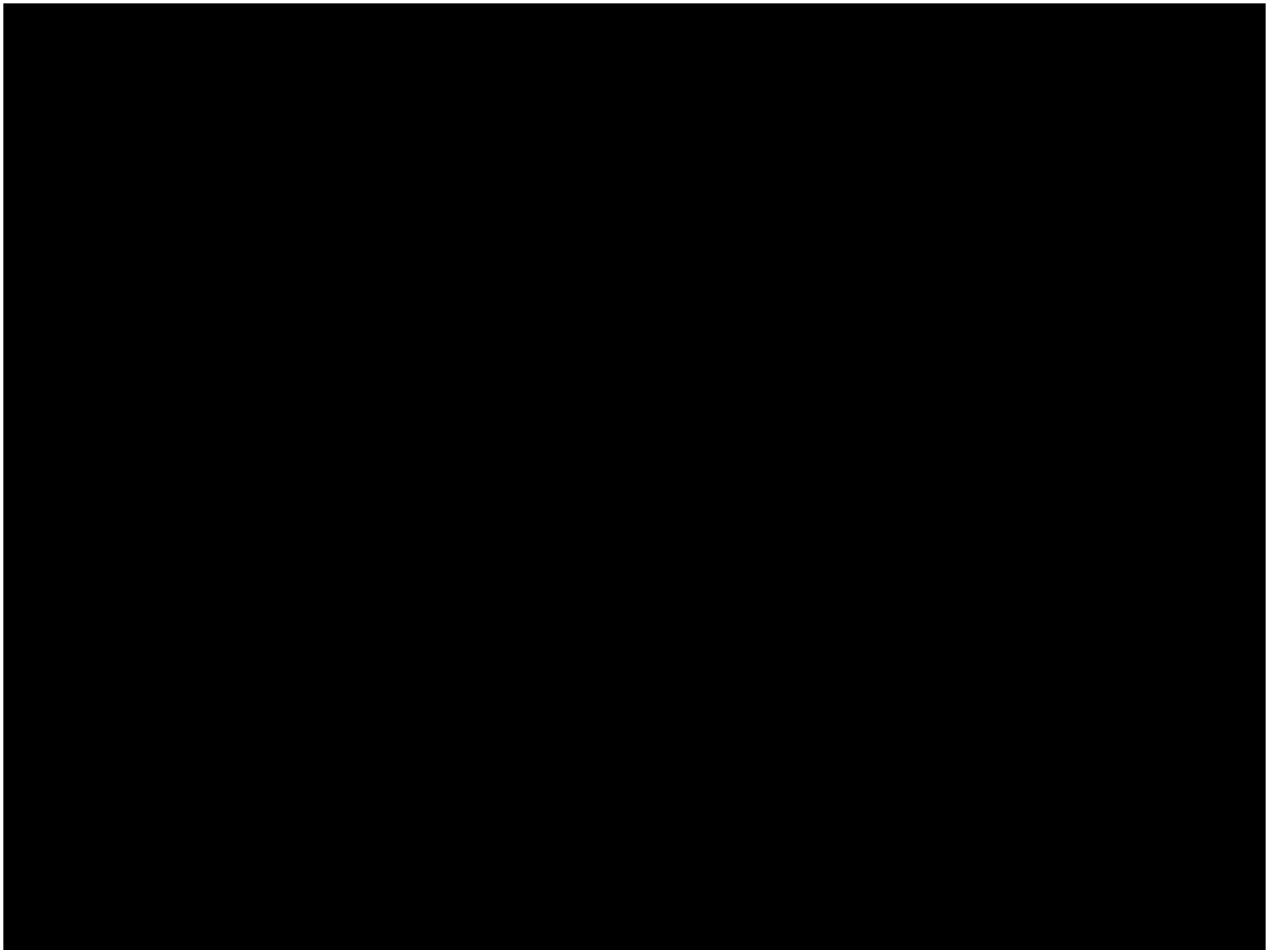
$$-72 + 108 = 36$$

Find the area bound by the x-axis and $f(x) = -x^2 + 5x - 6$.

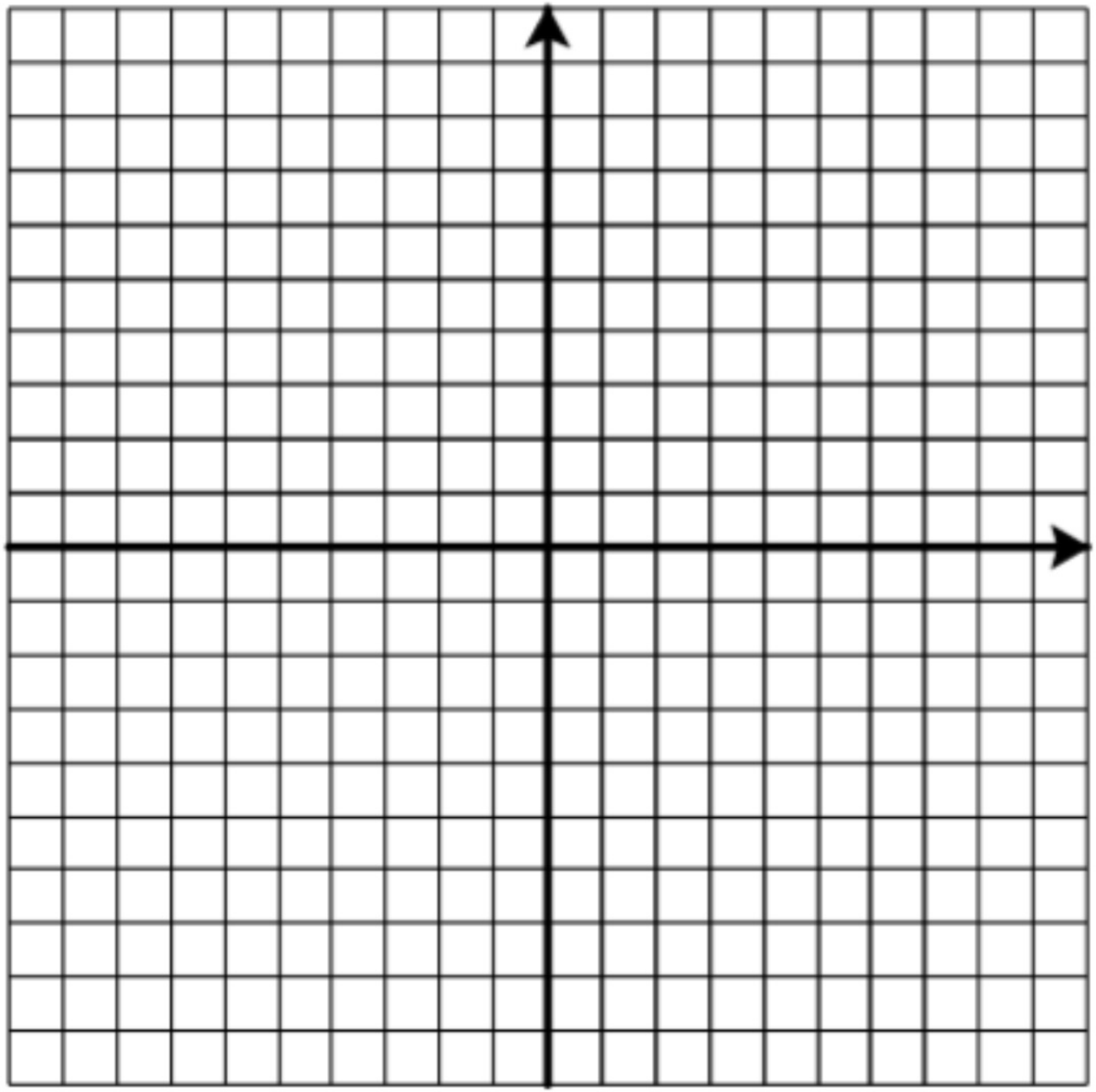
Do this without the use of a GDC.

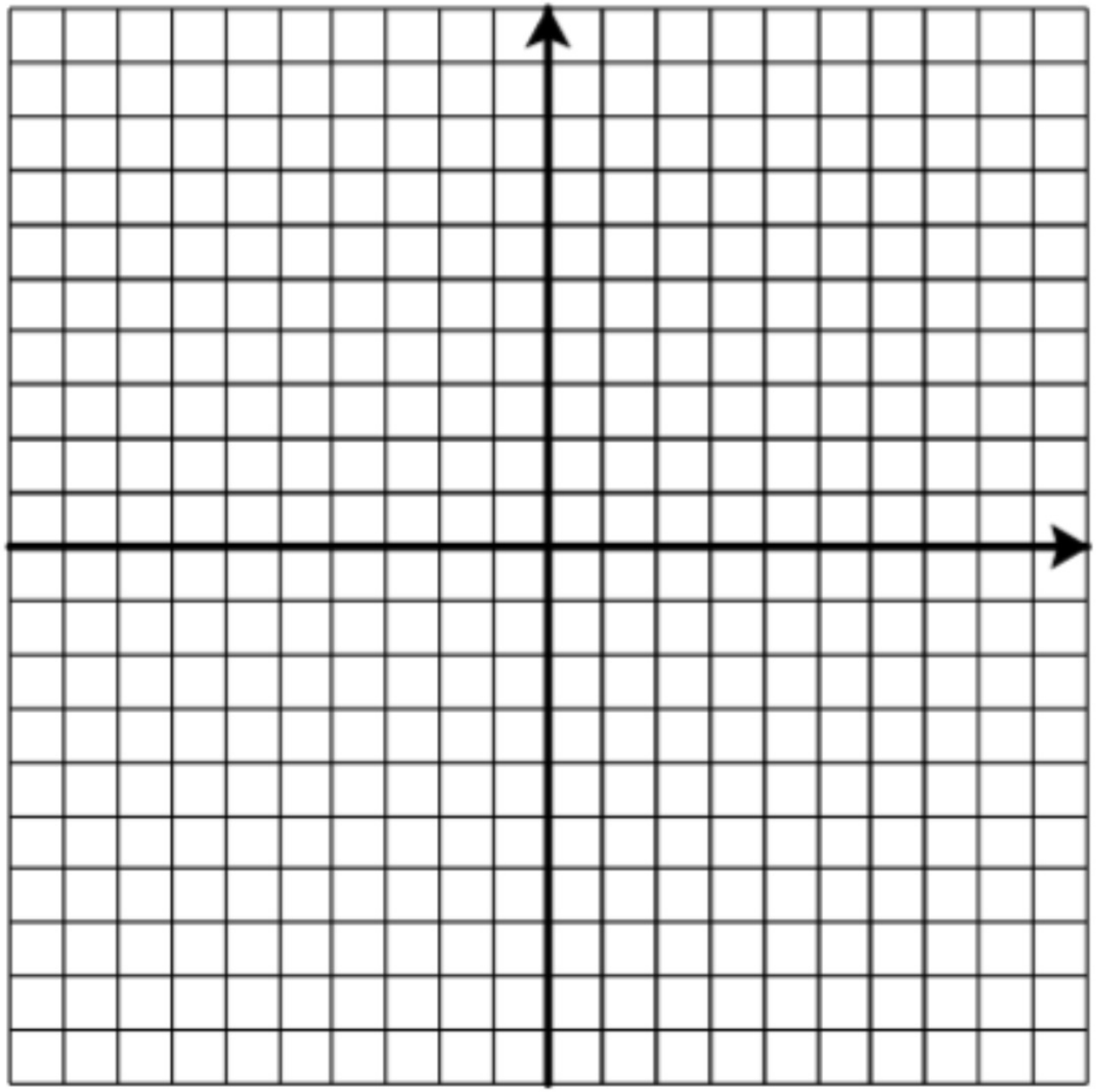


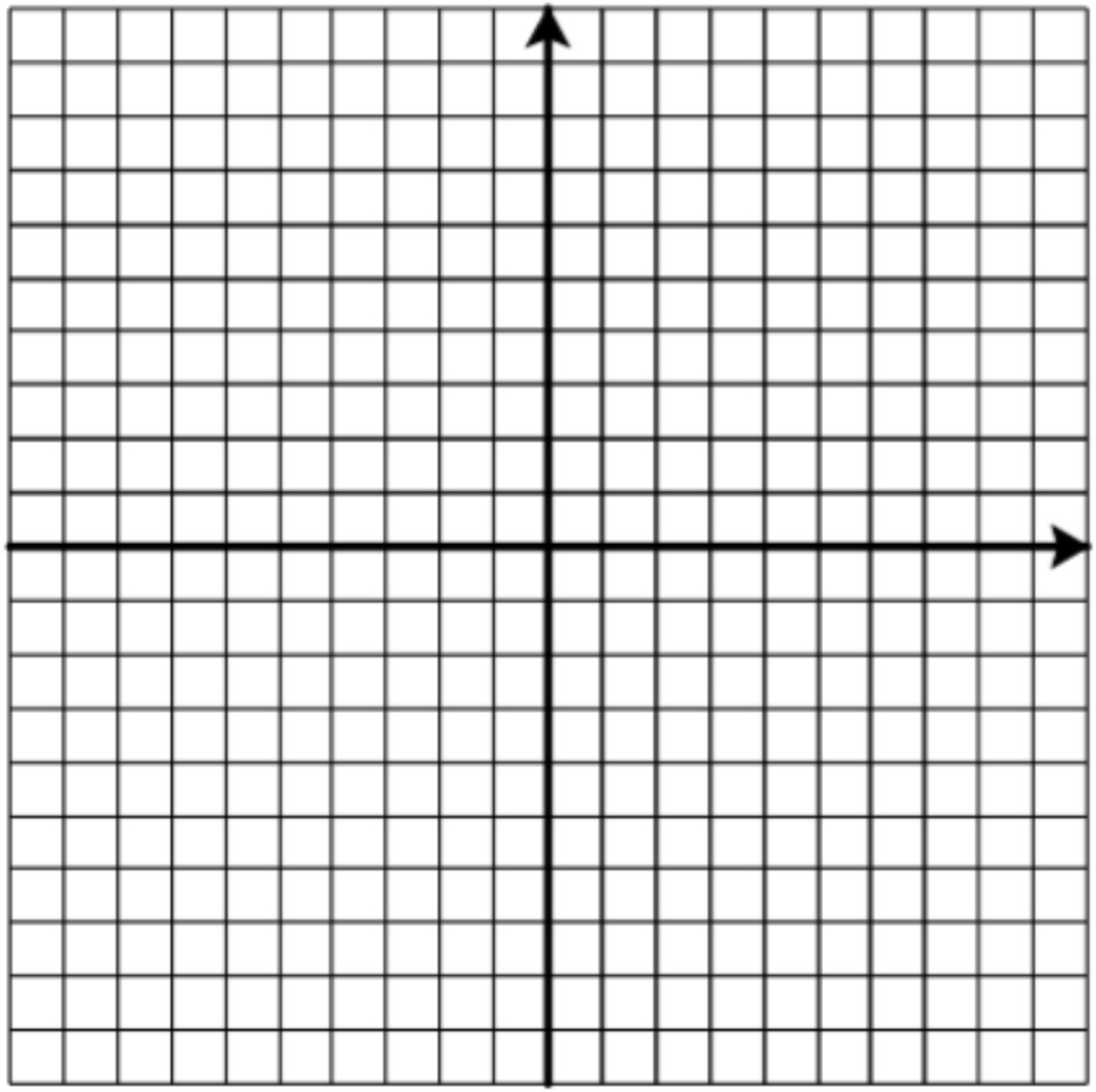
$$f(x) = -x^2 + 5x - 6$$



$$f(x) = -x^2 + 4x$$







$$f(x) = x^3 - 2x^2 - 5x + 3$$

$f(x) = -x^3 + 2x^2$ from 0 to 2

$$f(x) = \frac{-x^2}{4} + 4$$

$$\pm 4 = x$$

$$0 = \frac{-x^2}{4} + 4$$

$$-4 \qquad -4$$

$$\int f(x)\,dx$$

$$\cdot 4 \quad \cdot 4$$

$$\frac{-16}{-1} = \frac{-x^2}{-1}$$

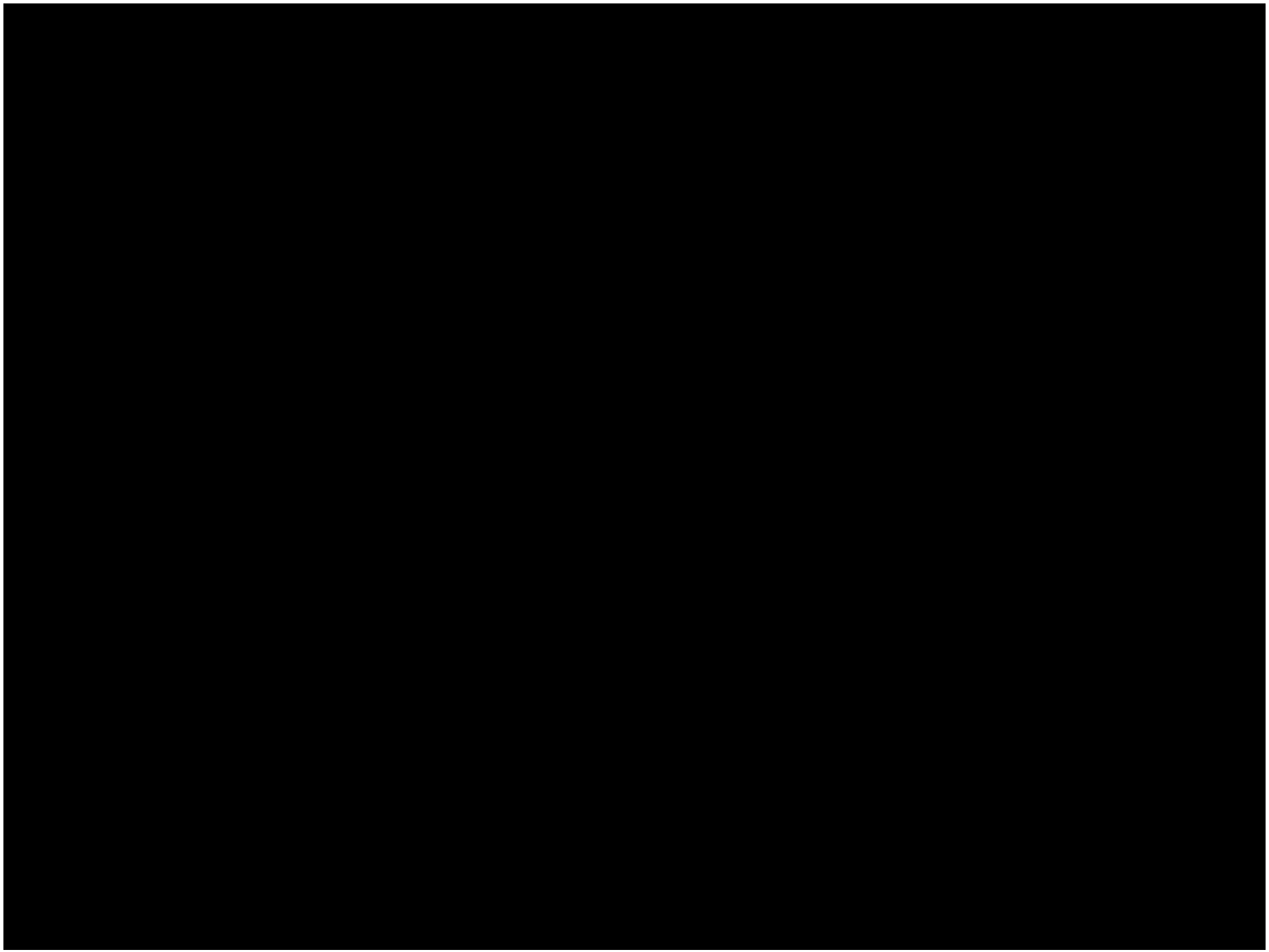
$$\int_{-4}^{4} \left(\frac{-x^2}{4} + 4\right) dx$$

$$16 = x^2$$

$$\left| \frac{-x^3}{12} + 4x \right|_{-4}^{4}$$

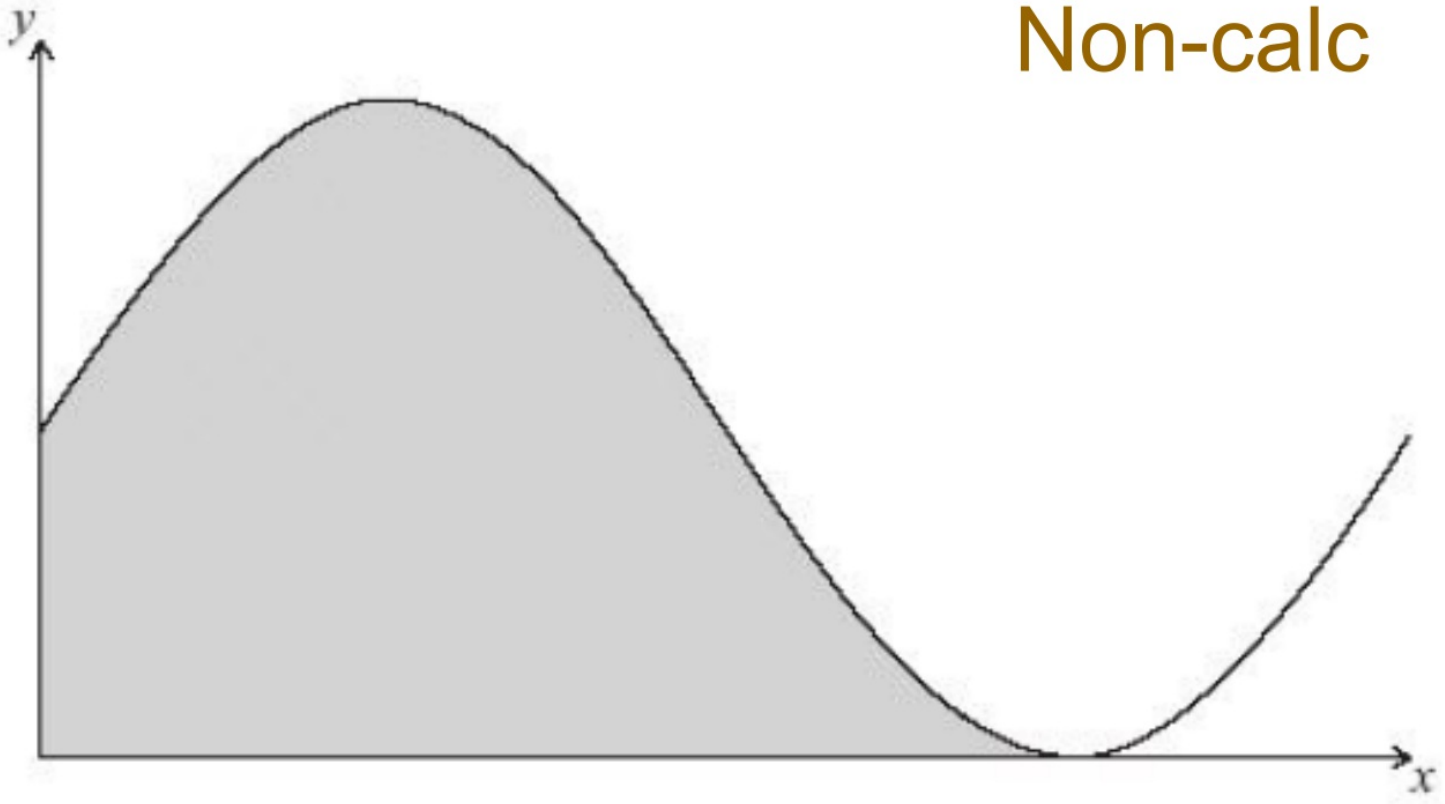
$$4 = 4x^0$$

$$\frac{4x^1}{1} = 4x$$



Let $f(x) = 6 + 6\sin x$. Part of the graph of f is shown below.

Non-calc



The shaded region is enclosed by the curve of f, the x-axis, and the y-axis.