Find all real zeros of the function.

$$h(x) = 5(x^2 + 25)(x - 16)(x + 3)^2$$

$x^2 + 25 = 0$

$x^2 = -25$

$x - 16 = 0$

$x = 16$

$x + 3 = 0$

$x = -3$

multiplicity of 2

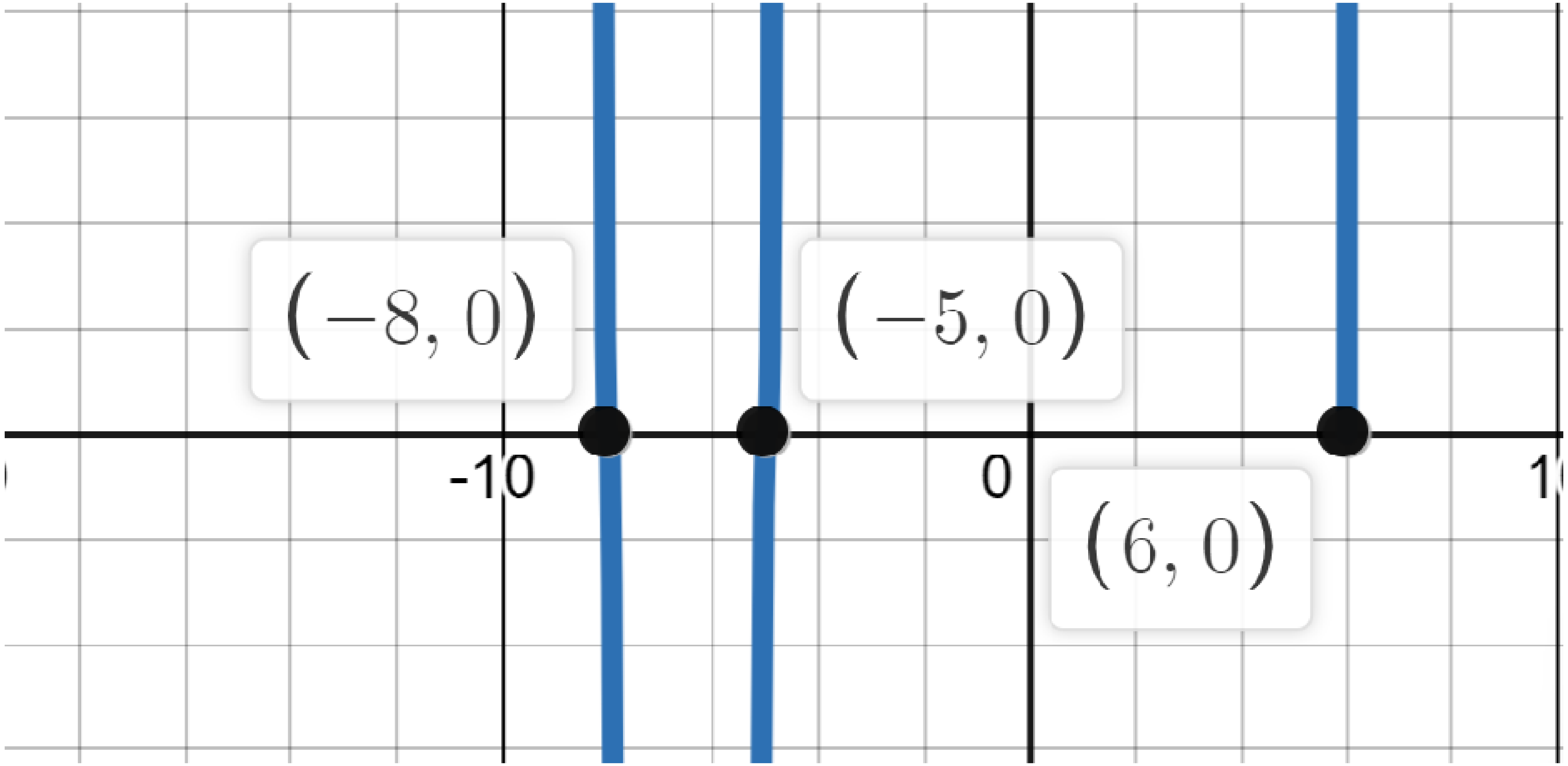
Suppose that the polynomial function f is defined as follows.

$$f(x) = 2(x-6)^2(x+8)^3(x+5)^3$$

$x = 6$ (2)

$x = -8$ (3)

$x = -5$ (3)



$$(x+2i)(x-2i)$$

$$i = \sqrt{-1}$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

$$i^{95} = -i$$

$$95/4 = .75$$

$$3/4$$

$(x+2i)(x-2i)$

$x^2 - 2ix + 2ix - 4i^2$ (-1)

$x^2 + 4$

$x = -2i$ $x = \pm 2i$

$x = 2i$

Find a polynomial $f(x)$ of degree 3 that has the following zeros.

8 (multiplicity 2), -4

$$(x-8)^2(x+4)$$

Find a polynomial $f(x)$ of degree 3 with real coefficients and the following zeros.

$-2, \; -3+i$

$$(x+2)\big((x+(-3+i))(x-(-3+i))\big)$$

$$(x+2i)(x-2i)$$

Find a polynomial $f(x)$ of degree 3 with real coefficients and the following zeros.

$-2, \ -3+i$

$(x-(-3-i))(x-(-3+i))$

$(x+2)$

$(x+3+i)(x+3-i)$

$\boxed{(x+2)(x^2+6x+10)}$

$x^2 + 3x - xi$

$+3x + 9 - 3i$

$+xi + 3i - i^2$

$x^2 + 6x + 9 - (-1)$

The function below has at least one rational zero.
Use this fact to find *all* zeros of the function.

$$g(x) = 7x^4 + 27x^3 - 40x^2 + x + 5$$

$x = -5$

$x = 1$

-5	7	27	-40	1	5
		-35	40	0	-5
	7	-8	0	1	0
1		7	-1	-1	
	7	-1	-1	0	

$7x^2 - x - 1$

$b^2 - 4ac$

$(-1)^2 - 4(7)(-1)$

$1 + 28$ $\quad \sqrt{29}$

$$x = \frac{1 \pm \sqrt{29}}{14}$$

For the polynomial below, −3 and 2 are zeros.

$$g(x) = x^4 + 5x^3 - 3x^2 - 25x + 6$$

−3	1	5	−3	−25	6
		−3	−6	27	−6
2	1	2	−9	2	0 ✓
		2	8	−2	
	1	4	−1	0 ✓	

$(x^2 + 4x - 1)$

$b^2 - 4ac$

$(4)^2 - 4(1)(-1)$

$16 + 4 = \sqrt{20}$

$2\sqrt{5}$

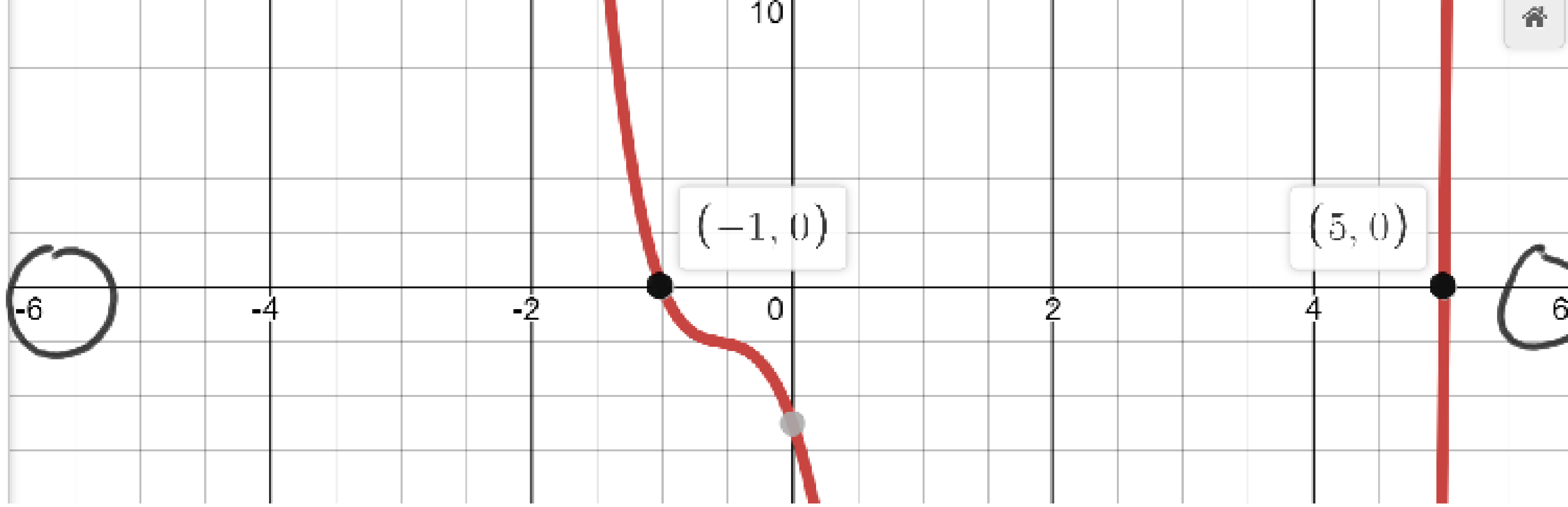
$$x = \frac{-4 \pm 2\sqrt{5}}{2}$$

$x = -2 \pm \sqrt{5}$

$x = -3$

$x = 2$

$$h(x) = 3x^4 - 10x^3 - 22x^2 - 14x - 5$$



-1	3	-10	-22	-14	-5
		-3	13	9	5
	3	-13	-9	-5	0 ✓
5		15	10	5	
	3	2	1	0 ✓	

$$3x^2 + 2x + 1$$

$$b^2 - 4ac$$

$$(2)^2 - 4(3)(1)$$

$$4 - 12 = \sqrt{-8} = 2i\sqrt{2}$$

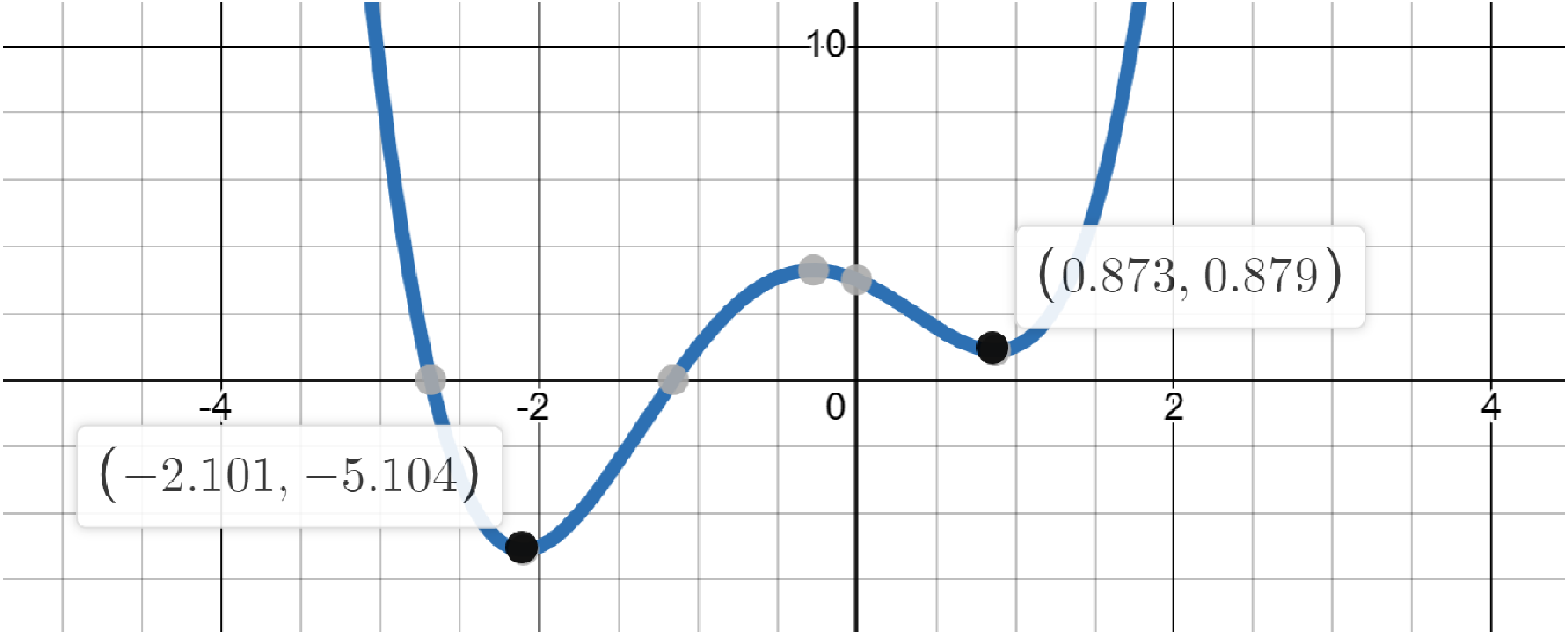
$$x = \frac{-2 \pm 2i\sqrt{2}}{6}$$

$$x = \frac{-1 \pm i\sqrt{2}}{3}$$

The polynomial function g is defined by $g(x) = x^4 + 2x^3 - 3x^2 - 2x + 3$.

Use the ALEKS graphing calculator to find all the points $(x, g(x))$ where there is a local minimum.

(-2.10, -5.10)   (0.87, 0.88)



On a rectangular piece of cardboard with perimeter 17 inches, three parallel and equally spaced creases are made. (See Figure 1.) The cardboard is then folded along the creases to make a rectangular box with open ends. (See Figure 2.) Letting x represent the distance (in inches) between the creases, use the ALEKS graphing calculator to find the value of x that maximizes the volume enclosed by this box. Then give the maximum volume. Round your responses to two decimal places.

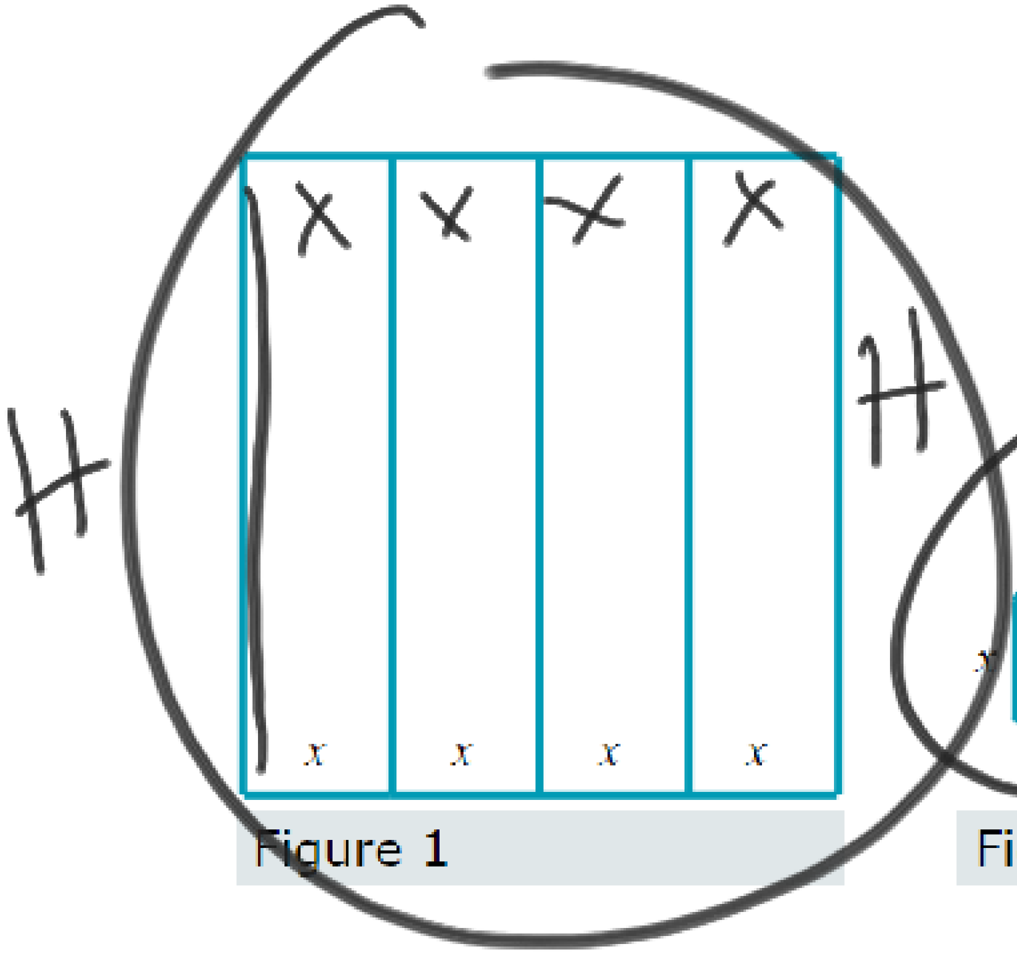


Figure 1

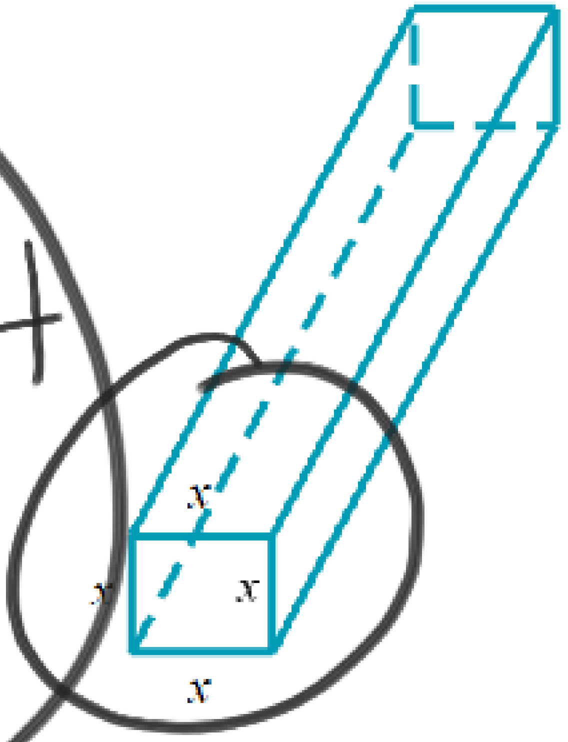


Figure 2

$P = 17$

$V = L \cdot W \cdot H$

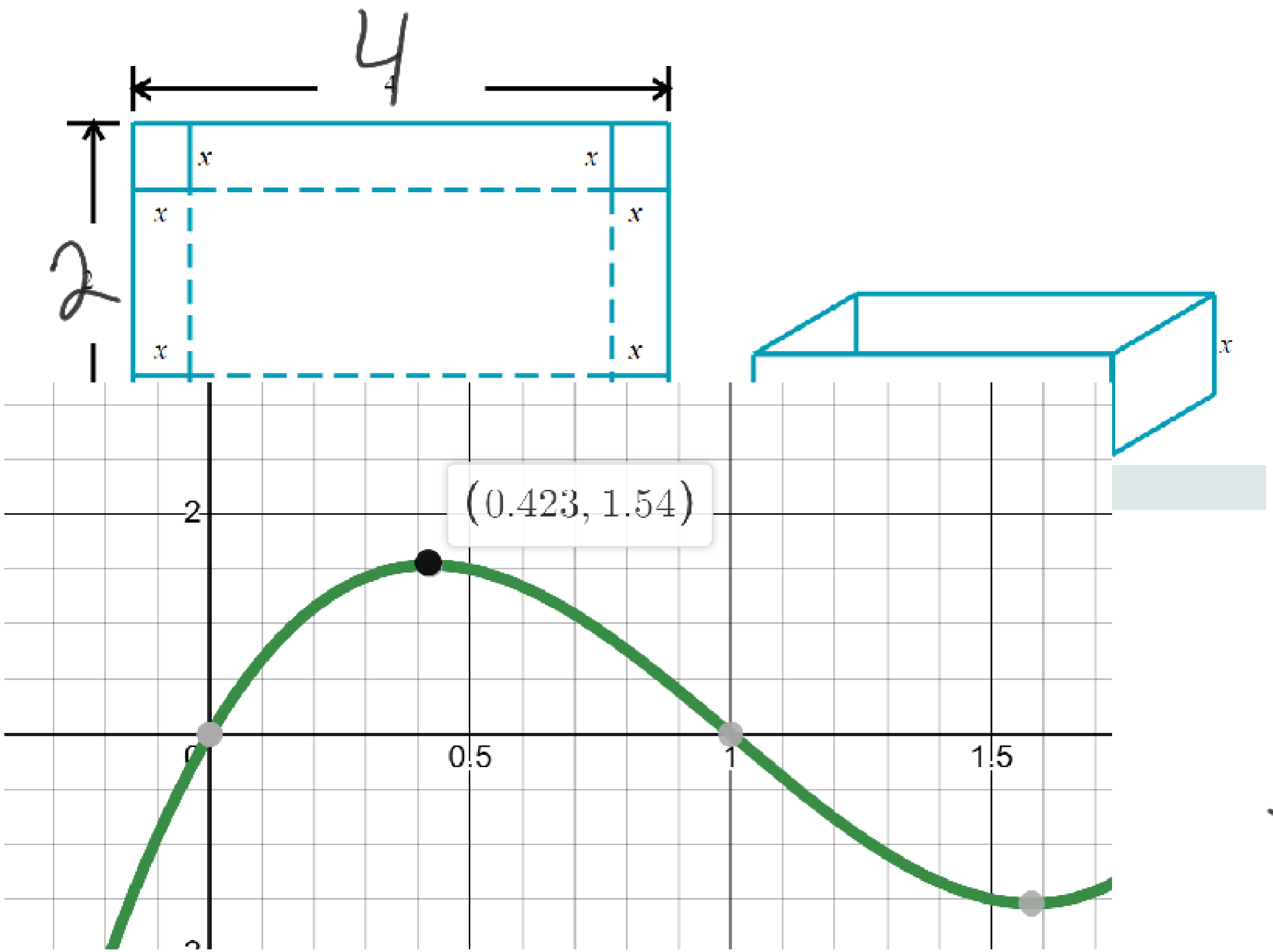
$L = X = 1.42\text{ in}$

$W = X$

$H = \frac{17 - 8x}{2}$

5.69 in^3

A manufacturer cuts squares from the corners of a rectangular piece of sheet metal that measures 2 inches by 4 inches. (See Figure 1.) The manufacturer then folds the metal upward to make an open-topped box. (See Figure 2.) Letting x represent the side-lengths (in inches) of the squares, use the ALEKS graphing calculator to find the value of x that maximizes the volume enclosed by this box. Then give the maximum volume. Round your responses to two decimal places.



$V = LWH$

$L = 4 - 2x$

$W = 2 - 2x$

$H = x = 0.42$ in

$V = 1.54$ in^3

L.C. →

\+ rightside → ∞

− rightside → $-\infty$

D →

even left same as right

odd left opp of right

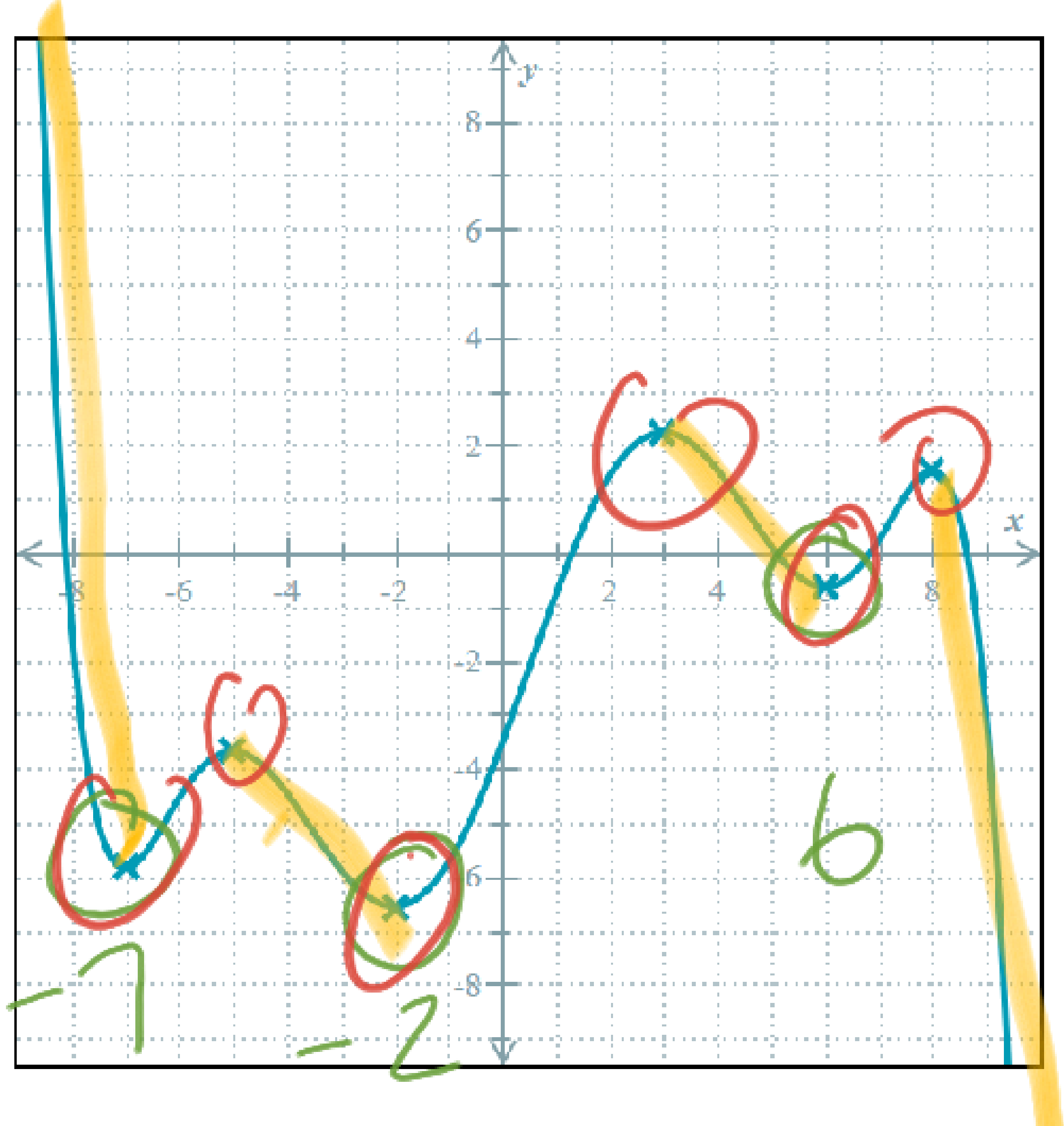
(a) $f(x) = -4x^3 + 6x^2 - 9x - 6$

(b) $f(x) = -5x^6 - 4x^4 - 5x^3 + 3$

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

(a) $f(x) = -4x^3 + 6x^2 - 9x - 6$ LC − D odd	○ Falls to the left and rises to the right ○ Rises to the left and falls to the right ○ Rises to the left and rises to the right ○ Falls to the left and falls to the right
(b) $f(x) = -5x^6 - 4x^4 - 5x^3 + 3$ LC − D even	○ Falls to the left and rises to the right ○ Rises to the left and falls to the right ○ Rises to the left and rises to the right ○ Falls to the left and falls to the right
(c) $f(x) = x^2(3x - 5)^2$ LC + D even	○ Falls to the left and rises to the right ○ Rises to the left and falls to the right ○ Rises to the left and rises to the right ○ Falls to the left and falls to the right

Below is the graph of a polynomial function with real coefficients. All local extrema of the function are shown in the graph.



Use the graph to answer the following questions.

(a) Over which intervals is the function decreasing? Choose all that apply.

- ☐ $(-\infty, -7)$
- ☐ $(-5, -2)$
- ☐ $(-7, -2)$
- ☐ $(3, 6)$
- ☐ $(6, 8)$
- ☐ $(8, \infty)$

(b) At which x-values does the function have local minima? If there is more than one value, separate them with commas.

-7, -2, 6

(c) What is the sign of the function's leading coefficient?

(Choose one)

negative

(d) Which of the following is a possibility for the degree of the function? Choose all that apply.

- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9