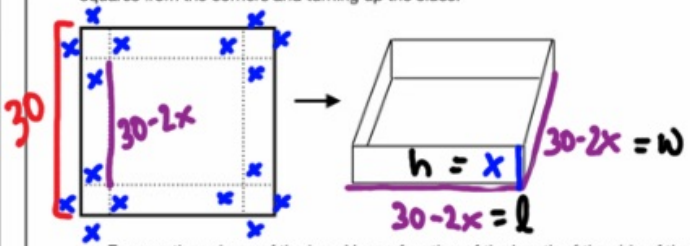
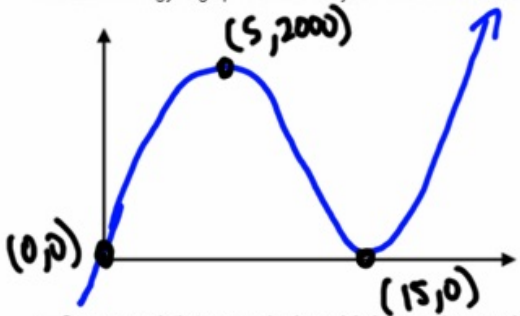
An open box is made from a square piece of cardboard 30 inches on a side by cutting identical squares from the corners and turning up the sides.



a. Express the volume of the box, V, as a function of the length of the side of the square cut from each corner, x.

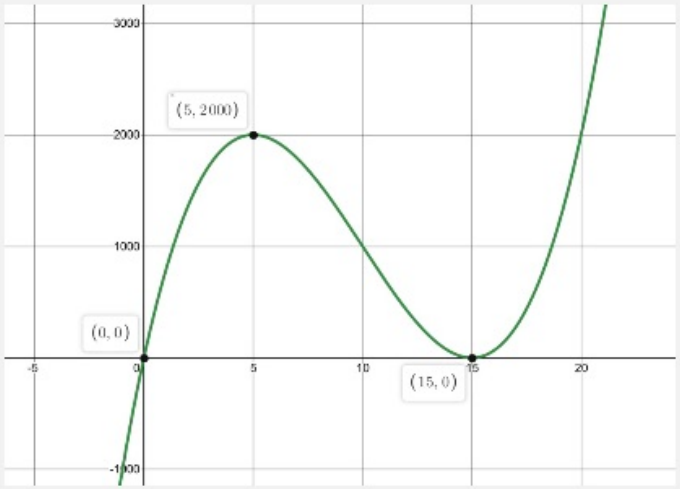
$V = l \cdot w \cdot h \rightarrow V(x) = (30-2x)(30-2x)(x)$ or $V(x) = x(30-2x)^2$

b. Use technology to graph the function you made. Sketch it below. Label your axis correctly.



c. On your graph that you made above, label the maximum and intercepts. Explain what they mean in context of the problem

x-intercepts → at x=0 and x=15, the Box would have now volume. At (5,2000) → that means

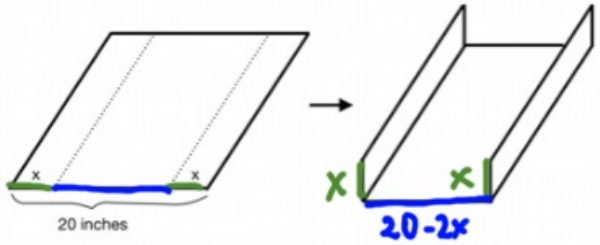


→ when x=5 the box will have a max volume of 2000in³.

d. State the Domain and Range of the function as it relates to the context of the problem.

Domain: (0,15) Range (0,2000]

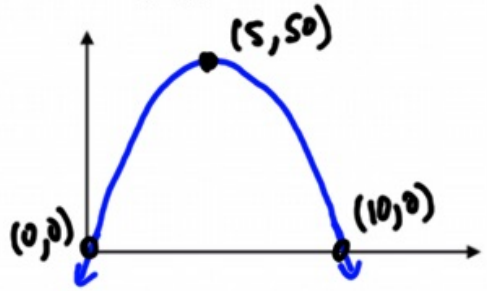
A rain gutter is made from sheets of aluminum that are 20 inches wide by turning up the edges to form right angles.



a. Express the cross-sectional area of the gutter, A, as a function of its depth, x.

$A(x) = x(20-2x)$

b. Use technology to graph the function you made. Sketch it below. Label your axis correctly.

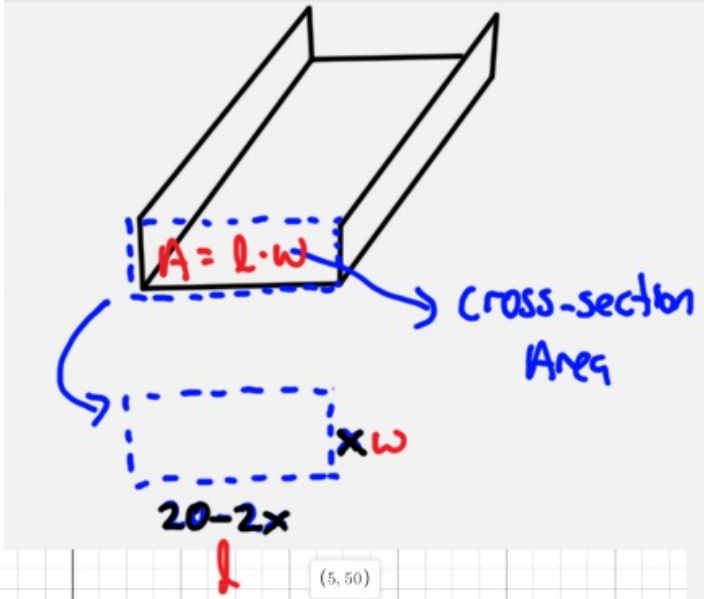


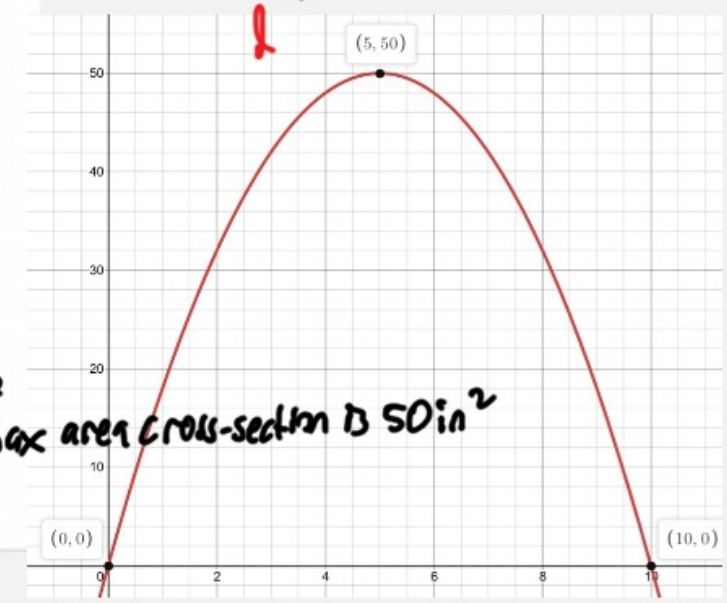
c. On your graph that you made above, label the maximum and intercepts. Explain what they mean in context of the problem

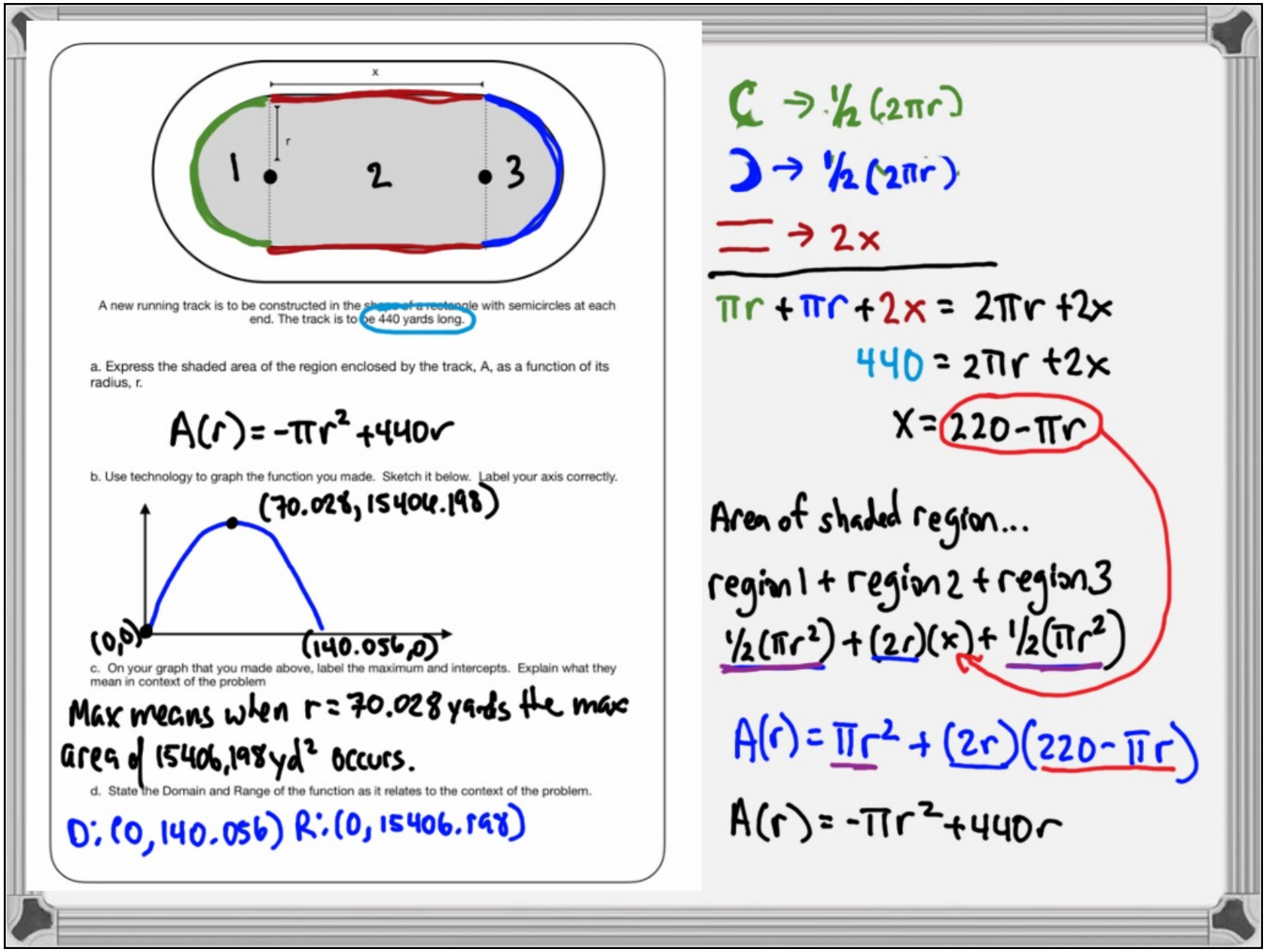
x-intercepts → at x=0 and x=10, the cross-section has no area. At (5,50) that means when x is 5 the ↳ max area cross-section is $50 in^2$

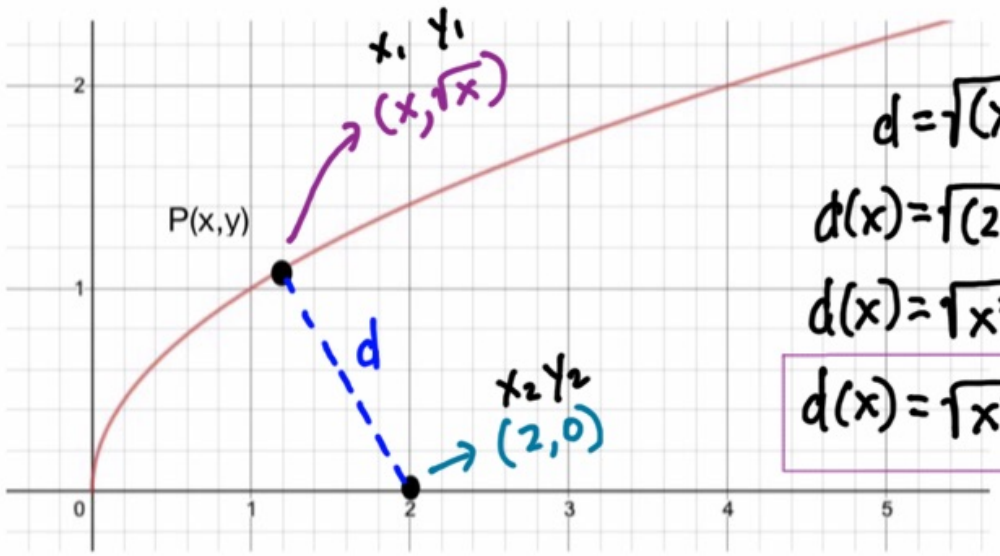
d. State the Domain and Range of the function as it relates to the context of the problem.

Domain (0,10) Range (0,50]






x
r
1
2
3
A new running track is to be constructed in the shape of a rectangle with semicircles at each end. The track is to be 440 yards long.
a. Express the shaded area of the region enclosed by the track, A, as a function of its radius, r.
$A(r) = -\pi r^2 + 440r$
b. Use technology to graph the function you made. Sketch it below. Label your axis correctly.
(70.028, 15406.198)
(0,0)
(140.056,0)
c. On your graph that you made above, label the maximum and intercepts. Explain what they mean in context of the problem
Max means when r = 70.028 yards the max area of 15406.198 yd² occurs.
d. State the Domain and Range of the function as it relates to the context of the problem.
D: (0, 140.056) R: (0, 15406.198)
C → ½(2πr)
→ ½(2πr)
= → 2x
πr + πr + 2x = 2πr + 2x
440 = 2πr + 2x
x = 220 − πr
Area of shaded region...
region 1 + region 2 + region 3
½(πr²) + (2r)(x) + ½(πr²)
A(r) = πr² + (2r)(220 − πr)
A(r) = −πr² + 440r



x_1 y_1
$(x, \sqrt{x})$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d(x) = \sqrt{(2-x)^2 + (0-\sqrt{x})^2}$$

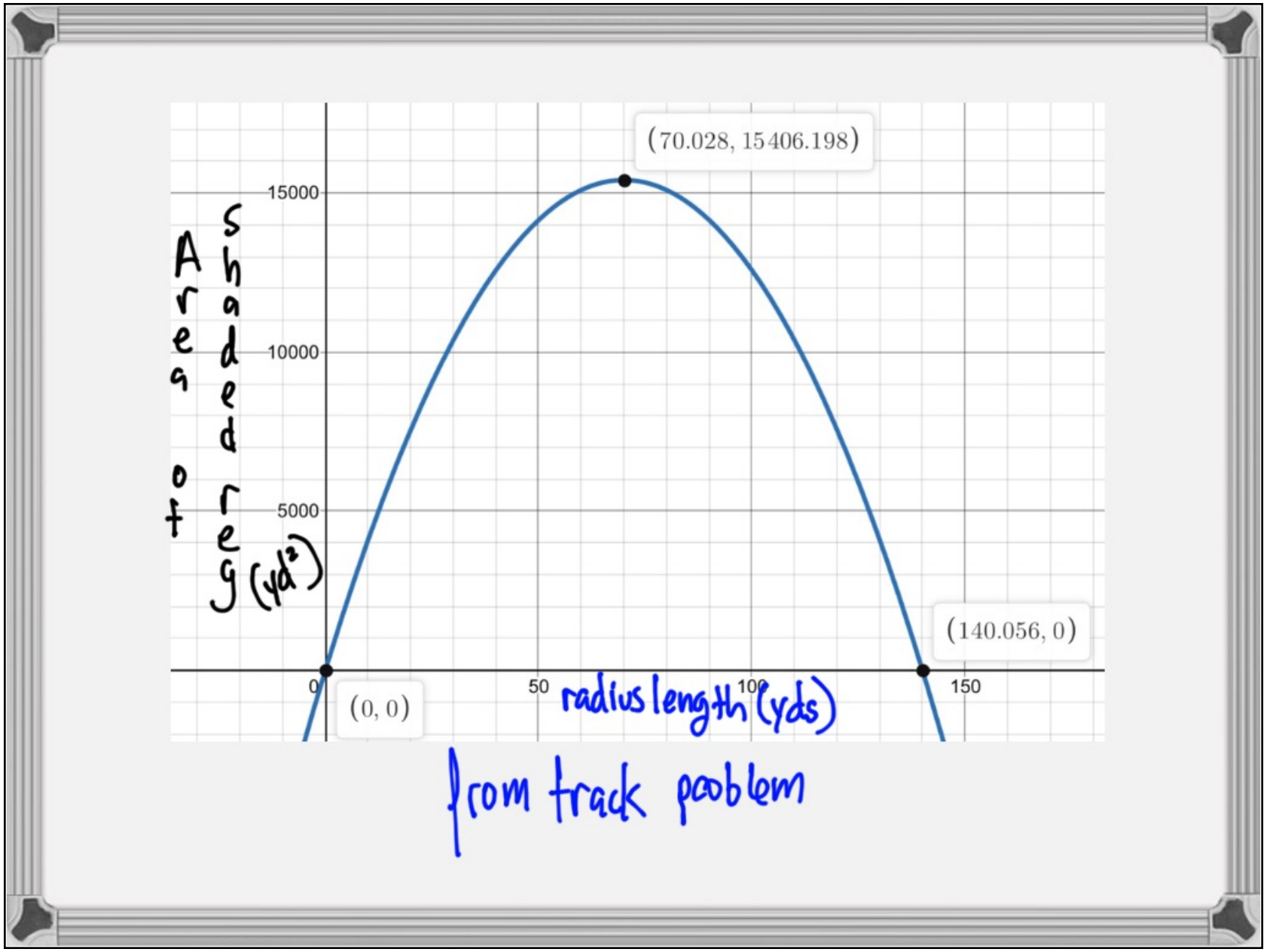
$$d(x) = \sqrt{x^2 - 4x + 4 + x}$$

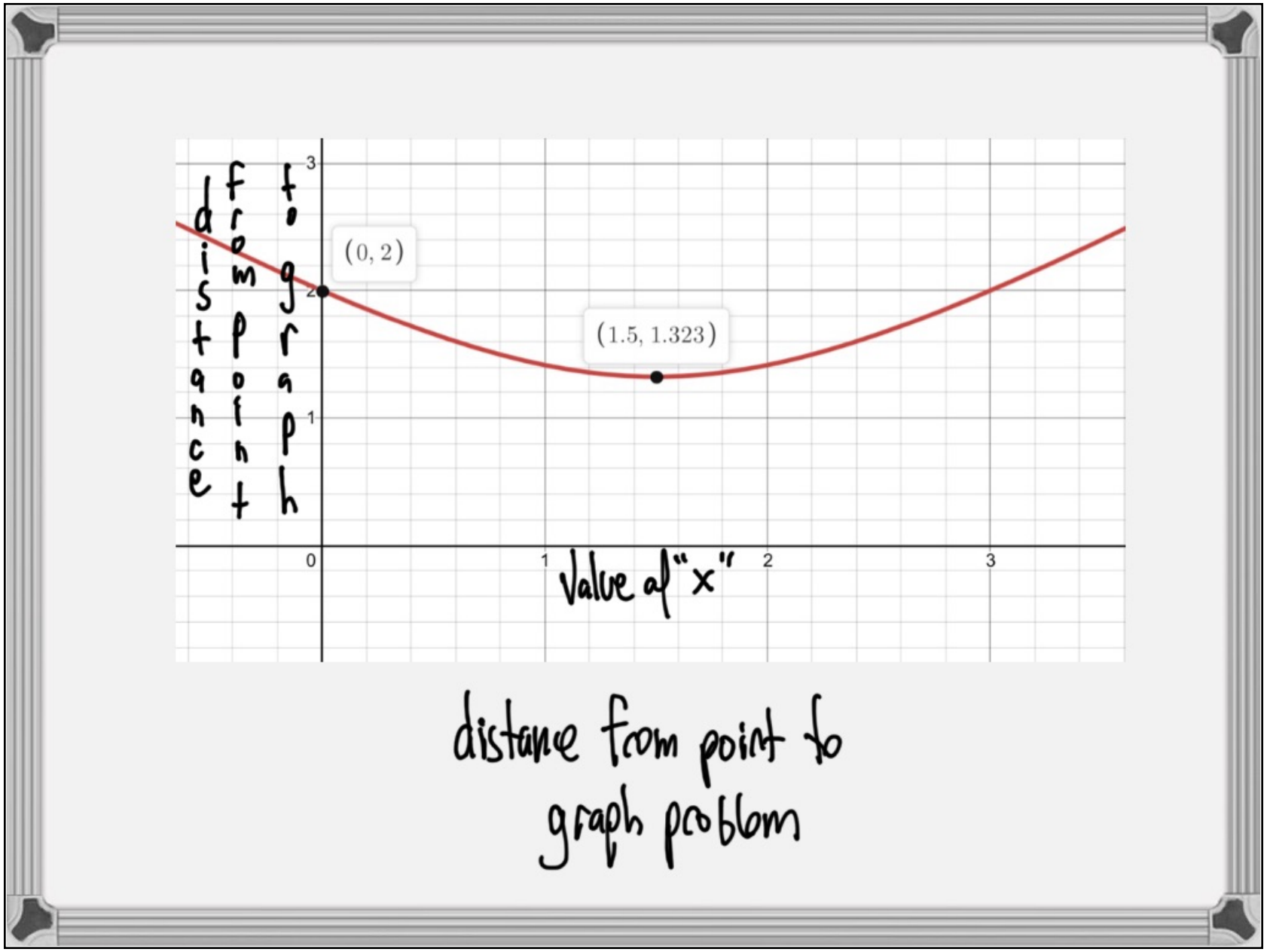
$$d(x) = \sqrt{x^2 - 3x + 4}$$

In the digram above, P(x,y) is any point that is on the graph of $y = \sqrt{x}$
(2,0) is a fixed point not on the graph.

Let P(x,y) be a point on the graph of $y = \sqrt{x}$ Express the distance, d, from point P to (2,0) as a function of the point's x - coordinate. (You'll need the distance formula.)

Shortest distance from (2,0) to the graph is 1.323 units


(70.028, 15406.198)
15000
10000
5000
Area of shaded region (yd²)
(140.056, 0)
0
(0, 0)
50
100
150
radius length (yds)
from track problem


distance from point to graph
(0, 2)
(1.5, 1.323)
3
2
1
0
1
2
3
Value of "x"
distance from point to graph problem