3-27. After solving the equation $2x^2 + 5x - 3 = x^2 + 4x + 3$, Gustav gets called to the office and leaves his team. When his teammates examine his graphing calculator to figure out how he found his solution, they only see the graph of $y = x^2 + x - 6$. Consider this situation as you complete the parts below.

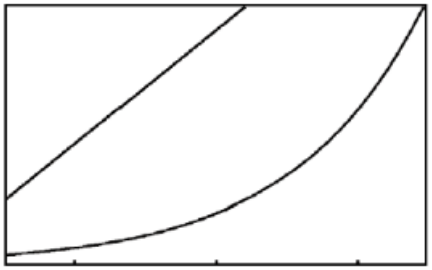
a. Solve $2x^2 + 5x - 3 = x^2 + 4x + 3$ algebraically.

b. Where does Gustav get the equation $y = x^2 + x - 6$?

c. How many solutions will $y = x^2 + x - 6$ have?

d. How can you see the solutions to $2x^2 + 5x - 3 = x^2 + 4x + 3$ in the graph of $y = x^2 + x - 6$? Explain why this makes sense.

3-28. Yajaira cannot figure out how to solve $20x + 1 = 3^x$ algebraically, so she decides to use her graphing calculator. However, when she graphs the equations $y = 20x + 1$ and $y = 3^x$, she gets the graph shown at right. After studying the graph, Yajaira thinks there are no solutions to $20x + 1 = 3^x$.

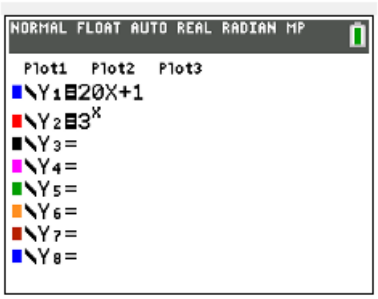


a. What do you think? If there are solutions, what are they? If there are no solutions, demonstrate that there cannot be a solution.

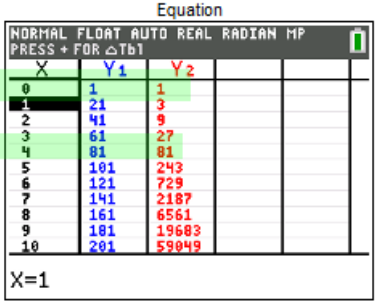
b. What should solutions to the equation $20x + 1 = 3^x$ look like? In other words, will solutions be a single number, or will they be the coordinates of a point? Explain.

c. Yajaira's teammate, Emma, starts to solve by subtracting 1 from both sides of the equation. When she graphs her system later, she uses the equations $y = 20x$ and $y = 3^x - 1$. Will she get the same solutions? Test your conclusion using your graphing calculator.

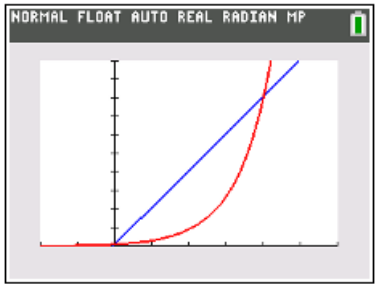
d. Discuss with your team why Yajaira cannot solve the system algebraically. What do you think?



Equation

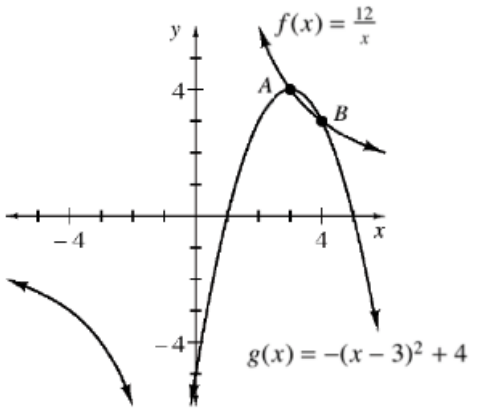


Table



Graph

3-29. Jack was working on solving an equation and he graphed the functions $f(x) = \frac{12}{x}$ and $g(x) = -(x-3)^2 + 4$, as shown at right.



a. What equation was Jack solving?

b. Use points A and B to solve the equation you wrote in part (a).

c. Are there any other solutions to the equation you wrote in part (a)? If so, show that these other solutions make your equation true.

$f(x) = g(x)$

$\frac{12}{x} = -(x-3)^2 + 4$

$12 = -x(x-3)^2 + 4x$

$12 = -x^3 + 6x^2 - 9x + 4x$

$12 = -x^3 + 6x^2 - 5x$

$\frac{12}{4} = -(4-3)^2 + 4$

$3 \stackrel{\checkmark}{=} -(1)^2 + 4$

$\frac{12}{3} = -(3-3)^2 + 4$

$4 \stackrel{\checkmark}{=} -(0) + 4$

$x = -1$