Name_____ Date _____

3.5 Solving Nonlinear Systems

For use with Exploration 3.5

Essential Question How can you solve a nonlinear system of equations?

1 EXPLORATION: Solving Nonlinear Systems of Equations

Work with a partner. Match each system with its graph. Explain your reasoning. Then solve each system using the graph.

a. $y = x^2$
$y = x + 2$

b. $y = x^2 + x - 2$
$y = x + 2$

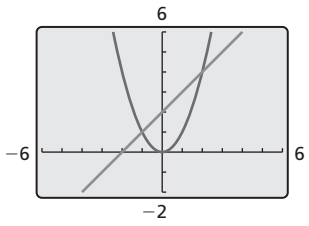
c. $y = x^2 - 2x - 5$
$y = -x + 1$

d. $y = x^2 + x - 6$
$y = -x^2 - x + 6$

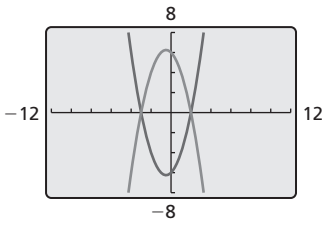
e. $y = x^2 - 2x + 1$
$y = -x^2 + 2x - 1$

f. $y = x^2 + 2x + 1$
$y = -x^2 + x + 2$

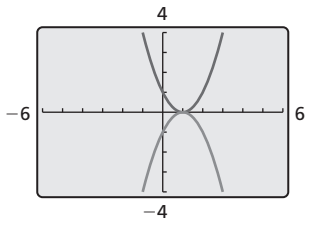
A.



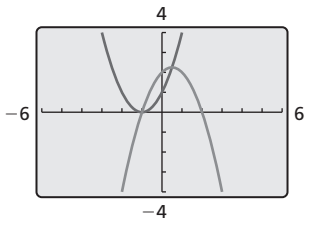
B.



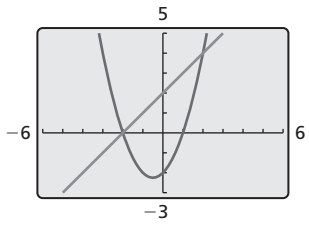
C.



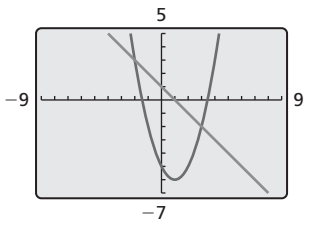
D.



E.



F.



2 EXPLORATION: Solving Nonlinear Systems of Equations

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Look back at the nonlinear system in Exploration 1(f). Suppose you want a more accurate way to solve the system than using a graphical approach.

a. Show how you could use a *numerical approach* by creating a table. For instance, you might use a spreadsheet to solve the system.

b. Show how you could use an *analytical approach*. For instance, you might try solving the system by substitution or elimination.

Communicate Your Answer

3. How can you solve a nonlinear system of equations?

4. Would you prefer to use a graphical, numerical, or analytical approach to solve the given nonlinear system of equations? Explain your reasoning.

$y = x^2 + 2x - 3$

$y = -x^2 - 2x + 4$

Name_____ Date _____

3.5 Notetaking with Vocabulary

For use after Lesson 3.5

In your own words, write the meaning of each vocabulary term.

system of nonlinear equations

Core Concepts

Solve Equations by Graphing

Step 1 To solve the equation $f(x) = g(x)$, write a system of two equations, $y = f(x)$ and $y = g(x)$.

Step 2 Graph the system of equations $y = f(x)$ and $y = g(x)$. The x-value of each solution of the system is a solution of the equation $f(x) = g(x)$.

Notes:

Name _____ Date _____

3.5 Notetaking with Vocabulary (continued)

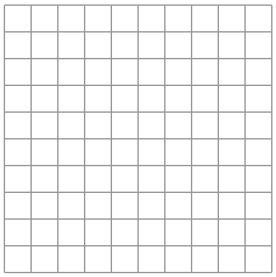
Extra Practice

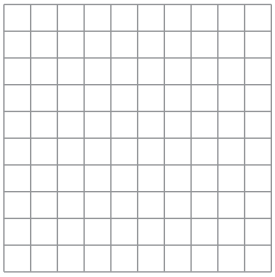
In Exercises 1–3, solve the system by graphing. Check your solution(s).

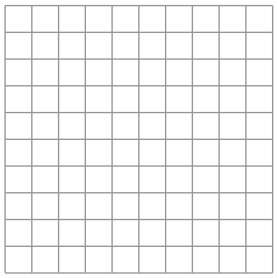
1. $y = \frac{1}{2}x^2 - 3$
$y = -4 - 2x^2$

2. $y = (x - 2)^2$
$y = \frac{1}{4}x - \frac{1}{2}$

3. $y = -x^2 - 2$
$y = 4(x + 1) - 3$

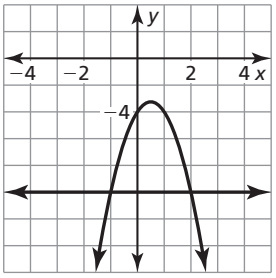




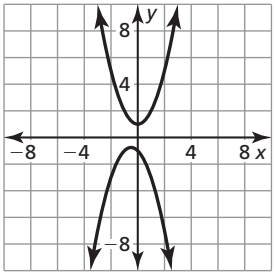


In Exercises 4 and 5, solve the system of nonlinear equations by using the graph.

4.



5.



In Exercises 6–8, solve the system by substitution.

6. $y = x + 4$
$y = (x + 2)^2 + 1$

7. $x^2 + y^2 = 16$
$y = -x + 4$

8. $2x^2 + 10x + 48 = y - 10x$
$-4x^2 - 16x = y$

Name_____ Date _____

3.5 Notetaking with Vocabulary (continued)

In Exercises 9–11, solve the system by elimination.

9. $x^2 - 7x + 11 = y - 1$
$-x + y = -4$

10. $y = 9x^2 + 6x + 2$
$y = x^2 - 8x - 19$

11. $-5x + 29 = y - x^2$
$x^2 + y = 2x^2 - 1$

12. Consider the following system.

$x^2 = 9 - y^2$
$x + 2y = 2x^2 + 7 + x$

a. Which method would you use to solve the system? Explain your reasoning.

b. Would you have used a different method if the system had been as follows? Explain.

$x = 9 - y$
$x + 2y = 2x^2 + 7 + x$

13. The sum of two numbers is -5, and the sum of the squares of the two numbers is 17. What are the two numbers? Explain your reasoning.