Math 3 Unit 2: Solving Equations and Inequalities

Unit	Title	Standards
2.1	Analyzing Piecewise Functions	F.IF.9
2.2	Solve and Graph Absolute Value Equations	F.IF.7B F.BF.3
2.3	Solve and Graph Absolute Value Inequalities	A.CED.3
2.4	Factoring and Solving Quadratic Equations	A.SSE.2
2.5	Solve and Graph Quadratic Equations	F.IF.7A
2.6	Factoring Sum and Difference of Cubes	F.IF.8, A.REI.4b
2.7	Solutions of Functions	F.IF.9
2.8	Graphing Systems of Inequalities	A.CED.3
Unit 2 Review		

Additional Clovis Unified Resources

http://mathhelp.cusd.com/courses/math-3

Clovis Unified is dedicated to helping you be successful in Math 3. On the website above you will find videos from Clovis Unified teachers on lessons, homework, and reviews. Digital copies of the worksheets, as well as hyperlinks to the videos listed on the back are also available at this site.

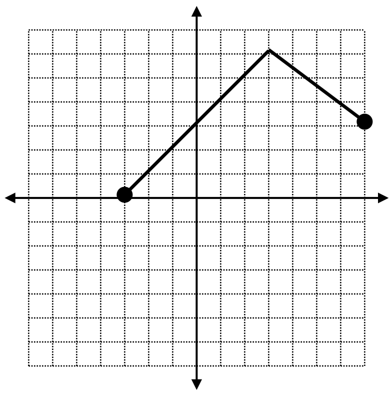
Math 3 Unit 2: Online Resources

2.1	Analyzing Piecewise Functions	• Patrick JMT: Find the Formula for a Piecewise Function from a Graph http://bit.ly/21pwfa • Patrick JMT: Finding the Domain and Range of a Piecewise Function http://bit.ly/21pwfb • Cool Math: Finding Relative Maximums and Minimums http://bit.ly/21pwfc
2.2	Solve and Graph Absolute Value Equations	• Virtual Nerd: Graph an Absolute Value Function http://bit.ly/22avea • Purple Math: Solving Absolute Value Equations http://bit.ly/22aveb • Patrick JMT: Simple Problems Solving Absolute Value Equations http://bit.ly/22avec • eHowEducation: Solving Absolute Value Equations http://bit.ly/22avee
2.3	Solve and Graph Absolute Value Inequalities	• Khan Academy: Solving Absolute Value Inequalities http://bit.ly/23avia • Mathispower4u: Solve and Graph Absolute Value Inequalities http://bit.ly/23avib
2.4	Factoring and Solving Quadratic Equations	• Khan Academy: Solving Quadratics by Factoring http://bit.ly/24fqea • Purple Math: Solving Quadratic Equations by Factoring http://bit.ly/24fqeb • Mroldridge: Factoring any Quadratic Equation http://bit.ly/24fqec
2.5	Solve and Graph Quadratic Equations	• Khan Academy: Graphing Quadratic Equations http://bit.ly/25sqea • Purple Math: Solving Quadratic Equations by Graphing http://bit.ly/25sqeb • Math Planet: Use Graphing to Solve Quadratic Equations http://bit.ly/25sqec • Purple Math: Solving Quadratic Equations by Taking Square Roots http://bit.ly/25sqed • Solving Quadratic Equations by Taking Square Roots http://bit.ly/25sqee
2.6	Factoring Sum and Difference of Cubes	• Purple Math: Factoring Sums & Differences of Cubes & Perfect Squares http://bit.ly/26sdca • Patrick JMT: Factoring Sums and Differences of Cubes http://bit.ly/26sdcb • Khan Academy: Factoring Sum of Cubes http://bit.ly/26sdcc • Melissa Gresham: Solving Polynomial Equations Using the Sum and Difference of Cubes http://bit.ly/26sdcd
2.7	Solutions of Functions	• M-Squared Tutorials: Finding solutions from a graph for when f(x) =0 http://bit.ly/27sofa • Purple Math: Finding solutions from a graph where *f(x) = g(x)* http://bit.ly/27sofb • Bethany M: Finding values of a function from a graph (ex: *f(2.5), f(0)*) http://bit.ly/27sofc • Virtual Nerd: Finding zeros of a function from a table of values http://bit.ly/27sofd
2.8	Graphing Systems of Inequalities	• Khan Academy: Graphing Linear Systems of Inequalities – No Solution http://bit.ly/28gsia • Patrick JMT: Graphing Linear Systems of Inequalities http://bit.ly/28gsib http://bit.ly/28gsic

Math 3 Unit 2 Worksheet 1
Analyzing Piecewise-defined Functions

Name:______________________________
Date:____________________**Per:**________

Answer the following questions about the piecewise-defined functions below.

1. 

(a) State the open interval(s) on which f is increasing.

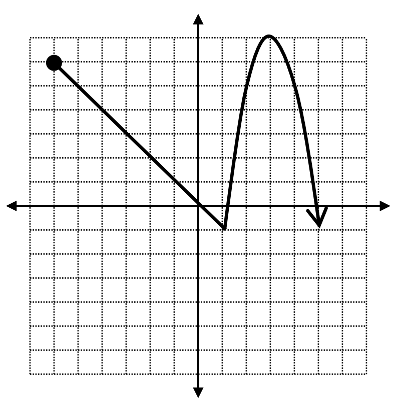
(b) State the open interval(s) on which f is decreasing.

(c) State the domain and range of f.

(d) State the coordinates of any relative minimums of f.

(e) State the coordinates of any relative maximums of f.

(f) Write a two pieced piecewise-defined function, f, that accurately represents the graph of f shown above.

2. 

(a) State the open interval(s) on which f is increasing.

(b) State the open interval(s) on which f is decreasing.

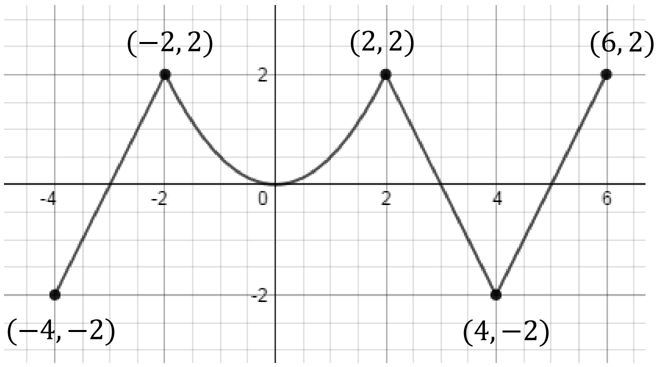
(c) State the domain and range of f.

(d) State the coordinates of any relative minimums of f.

(e) State the coordinates of any relative maximums of f.

(f) Write a two pieced piecewise-defined function, f, that accurately represents the graph of f shown above.

3.



(a) State the open interval(s) on which f is increasing.

(b) State the open interval(s) on which f is decreasing.

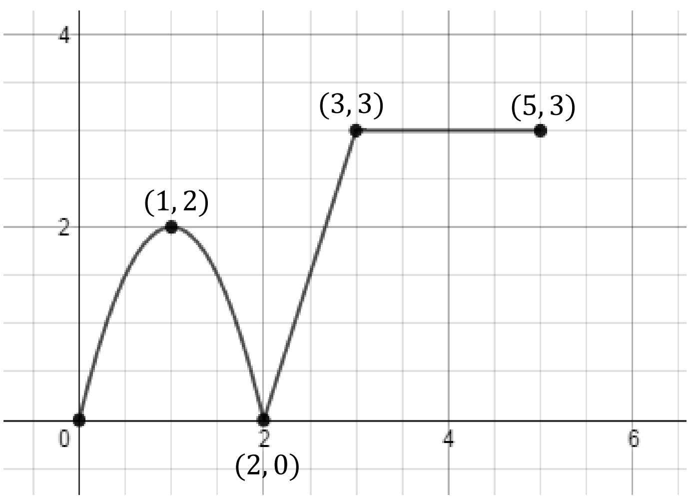
(c) State the domain and range of f.

(d) State the coordinates of any relative minimums of f.

(e) State the coordinates of any relative maximums of f.

(f) Write a three pieced piecewise-defined function, f, that accurately represents the graph of f shown above.

4.



(a) State the open interval(s) on which f is increasing.

(b) State the open interval(s) on which f is decreasing.

(c) State the open interval(s) on which f is constant.

(d) State the domain and range of f.

(e) State the coordinates of any relative minimums of f.

(f) State the coordinates of any relative maximums of f.

(g) Write a three pieced piecewise-defined function, f that accurately represents the graph of f shown above.

Math 3 Unit 2 Worksheet 2 **Name:**__________________________________

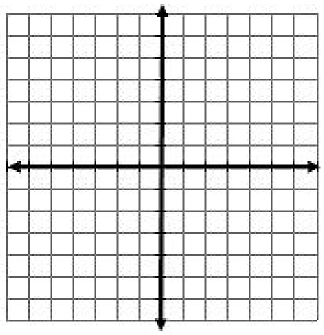
Solving and Graphing Absolute Value Equations **Date:**_______________________**Per:**_________

[1-4] Accurately graph $f(x)$ and $g(x)$ on the same set of axes.

1. $f(x) = |x - 2|$ and $g(x) = 3$

a) $f(x) = g(x)$ at $x =$ ________

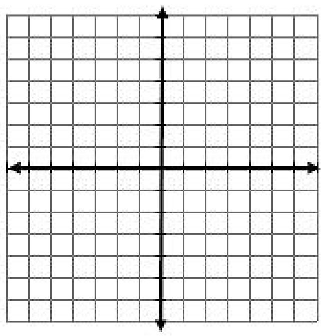
b) Solve algebraically for x, $|x - 2| = 3$



2. $f(x) = 2|x + 3|$ and $g(x) = 2$

a) $f(x) = g(x)$ at $x =$ ________

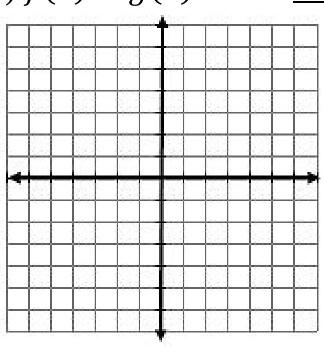
b) Solve algebraically for x, $f(x) = 2$



3. $f(x) = 3|x - 4|$ and $g(x) = -2$

a) $f(x) = g(x)$ at $x =$ ________

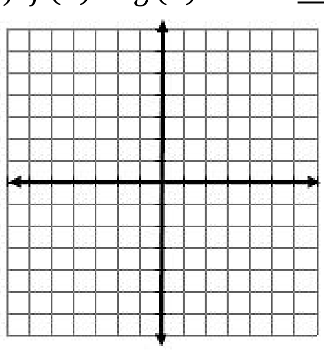
b) Solve algebraically for x, $f(x) = g(x)$



4. $f(x) = -\frac{1}{2}|x + 2| - 1$ and $g(x) = -1$

a) $f(x) = g(x)$ at $x =$ ________

b) Solve algebraically for x, $f(x) = g(x)$



[5-14] Solve the following absolute value equations for x and graph the solution(s) on a number line. If there is no solution write '*none*' and explain why.

5. $7 = |8x - 1|$

6. $f(x) = |x|$ and $g(x) = x + 9$
Solve: $f(g(x)) = -11$

7. $\frac{1}{7}|6 - 3x| = 3$

8. $f(x) = |x|$ and $g(x) = 2x - 5$
Solve: $3(f \circ g)(x) = 0$

9. $-2\left|\frac{1}{2}x + 4\right| = -12$

10. $f(x) = 5 + 2x$ and $g(x) = |x|$
Solve: $7 + g(f(x)) = 16$

11. $8 - |4x + 1| = 11$

12. $f(x) = 7x - 10$ and $g(x) = |x|$
Solve: $2(g \circ f)(x) + 1 = 9$

13. $f(x) = |x|$ and $g(x) = 3x - 6$
Solve: $7 - 3(f \circ g)(x) = -14$

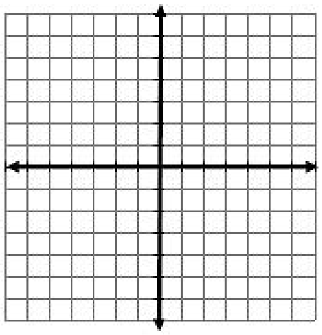
14. $5 + 2|4x + 7| = 1$

Math 3 Unit 2 Worksheet 3 **Name:______________________________**

Solving and Graphing Absolute Value Inequalities **Date:_____________________Per:________**

[1-4] Accurately graph $f(x)$ and $g(x)$ on the same set of axes.

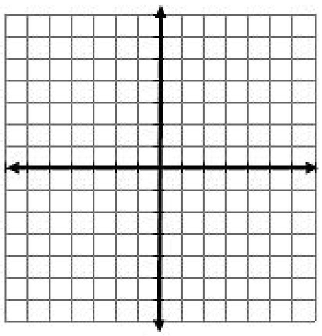
1. $f(x) = |x|$ and $g(x) = 5$



a) Highlight the portion of $g(x)$ where $f(x) \leq g(x)$ and state the interval along the x-axis._________________

b) Solve algebraically for x, $|x| \leq 5$

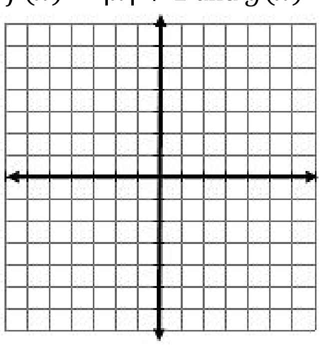
2. $f(x) = 2$ and $g(x) = -|x|$



a) Highlight the portion of $f(x)$ where $g(x) \geq f(x)$ and state in interval notation the interval along the x-axis._______________

b) Solve algebraically for x, $g(x) \geq f(x)$

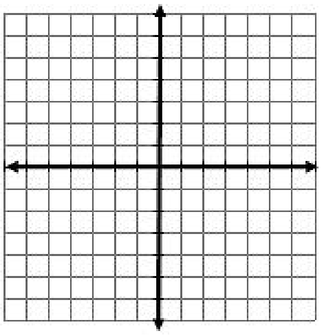
3. $f(x) = |x| + 1$ and $g(x) = -3$



a) Highlight the portion of $g(x)$ where $f(x) \geq g(x)$ and state the interval along the x-axis__________________

b) Solve algebraically for x in inequality notation, $f(x) \geq g(x)$

4. $g(x) = 5$ and $f(x) = |x - 2|$



a) Highlight the portion of $g(x)$ where $g(x) \leq f(x)$ and state the interval along the x-axis__________________

b) Solve algebraically for x in inequality notation, $g(x) \leq f(x)$

[5-14] Solve the following absolute value inequalities for x and graph the solution on a number line. Write the solution in interval notation. If there is no solution, explain why.

5. $|3x - 15| \geq 30$

6. $-\frac{1}{2}|x + 4| < 10$

7. $f(x) = |x|$ and $g(x) = 4x + 1$
Solve: $f(g(x)) - 14 < -5$

8. $|x| < -6$

9. $f(x) = 7 - 2x$ and $g(x) = |x|$
Solve: $2g(f(x)) - 1 \leq 37$

10. $\left|\frac{1}{7}x + 2\right| - 5 > 3$

11. $\left|\frac{5-x}{6}\right| < 2$

12. $-\frac{3}{7}|3x + 4| < -21$

13. $f(x) = |x|$ and $g(x) = x - 1$
Solve: $f(g(x)) - 3 \leq -5$

14. $\left|\frac{2}{3}x\right| + 4 > 2$

[15-16] Selected Response. Select **ALL** answers that apply

15. What is the solution of $|6x - 9| \leq 33$?

a. $-4 \leq x \leq 7$ b. $-7 \leq x \leq 4$ c. $x \leq -4 \text{ or } x \geq 7$ d. $x \leq 7 \text{ or } x \geq -4$

16. Which inequalities are equivalent to $-2|x - 3| < 8$?

a. $|x - 3| < -4$ b. $|x - 3| > -4$ c. $|x - 3| < 10$ d. $|-2x + 6| < 8$

[17-24] Use the definitions of absolute value equations and inequalities to determine if the statement is True or False.

17. True or False: $|3x + 7| = 13$ is equivalent to $3x + 7 = 13 \text{ or } 3x + 7 = -13$

18. True or False: $|9x + 1| < 19$ is equivalent to $9x + 1 < 19 \text{ or } 9x + 1 > -19$

19. True or False: $|2x - 4| < 12$ is equivalent to $-12 < 2x - 4 < 12$

20. True or False: $|6x - 4| = -10$ is equivalent to $6x - 4 = 10 \text{ or } 6x - 4 = -10$

21. True or False: $|2x + 5| > -1$ has no solution

22. True or False: $x < 2$ or $x > 7$ is equivalent to $7 < x < 2$

23. True or False: $x \leq 5$ or $x > -1$ is equivalent to $-1 < x \leq 5$

24. True or False: $x \geq -3$ or $x < -5$ is equivalent to $-3 \leq x < -5$

25. An archery store carries bows that are from 40 to 52 inches long. They recommend that bows be $\frac{2}{3}$ times a person's arm span, s.

a) Write a compound inequality, in terms of s, that represents the problem.

b) Solve the compound inequality from part a)

c) Graph the solution from part b) on a number line.

d) If a person's height is equivalent to their arm span, what is the height of the tallest person that the archery store carries bows for?

26. A sporting goods store carries softball bats that are from 25 to 35 inches long. They recommend that softball bats be $\frac{5}{8}$ of a person's height, h.

a) Write a compound inequality, in terms of h, that represents the problem.

b) Solve the compound inequality from part a)

c) Graph the solution from part b) on a number line.

d) What is the height of the shortest person the sporting goods store carries a softball bat for?

27. A space-themed miniature golf course named Puttnik carries putters from 24 to 40 inches long. They recommend that putters be $\frac{4}{9}$ times a person's height, h.

a) Write a compound inequality, in terms of h, that represents the problem.

b) Solve the compound inequality from part a)

c) Graph the solution from part b) on a number line.

d) What is the height of the tallest person that the golf course carries a putter for?

Math 3 Unit 2 Worksheet 4
Factoring and Solving Quadratic Equations

Name:________________________________
Date:_____________________ **Per:**_________

[1 – 16] Completely Factor the Following

1. $x^2 - 8x + 12$
2. $x^2 + x - 6$
3. $x^2 - 3x - 10$
4. $x^2 - 16$
5. $x^2 - 12x$
6. $x^2 + 4x - 5$
7. $2x^2 + 5x + 2$
8. $3x^2 + 4x + 1$
9. $4x^2 + 13x + 3$
10. $2x^2 + 7x + 5$
11. $8x^2 + 30x$
12. $25x^2 - 49$
13. $x(x - 5) + 3(x - 5)$
14. $7(x + 1) - x(x + 1)$
15. $3x^2 - 8x + 4$
16. $3x^2 + 5x + 2$

[17 – 25] Solve By Factoring

17. $x^2 - 7x + 10 = 0$
18. $x^2 - 4x - 12 = 0$
19. $2x^2 + 9x - 5 = 0$
20. $x(3x - 1) = 4$
21. $(x + 2)(2x - 1) = 3$
22. $(2x + 3)(3x + 1) = 3$
23. $4x^2 - 8x = 0$
24. $5x^2 = 10x$

25. $8x^2 + 2x = 3$

26. $9x^2 - 16 = 0$

27. $x(x-1) + 9(x-1) = 0$

28. $36x^2 = 121$

[29 – 34] Solve By Using Square Roots

29. $(x-5)^2 = 9$

30. $2(x+1)^2 = 24$

31. $(x+2)^2 - 7 = 17$

32. $1 + 3(x+4)^2 = 13$

33. $31 - 2(x-5)^2 = 7$

34. $1 + 2(2x-3)^2 = 17$

[35 – 38] Completely Simplify Each Expression

35. $\frac{6 \pm 12\sqrt{3}}{4}$

36. $\frac{9 \pm \sqrt{(-9)^2 - 4(1)(4)}}{2(1)}$

37. $\frac{-5 \pm \sqrt{5^2 - 4(5)(-1)}}{2(5)}$

38. $\frac{6 \pm \sqrt{(-6)^2 - 4(1)(-3)}}{2(1)}$

Math 3 Unit 2 Worksheet 5
Solving and Graphing Quadratic Equations

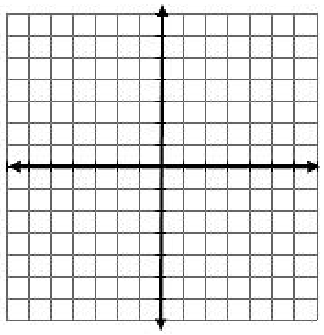
Name:______________________________
Date:____________________ **Per:**________

[1-4] Accurately graph $f(x)$ and $g(x)$ on the same set of axes.

1. $f(x) = -(x-1)^2 + 4$ and $g(x) = 0$

a) $f(x) = g(x)$ at $x =$ ________

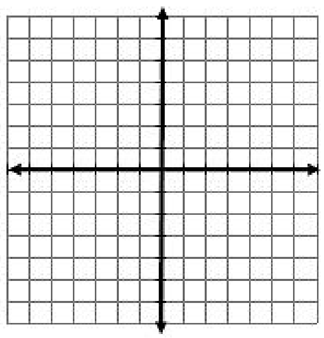
b) Solve algebraically for x: $-(x-1)^2 + 4 = 0$



2. $f(x) = \frac{1}{2}(x-2)^2 - 2$ and $g(x) = 0$

a) $f(x) = g(x)$ at $x =$ ________

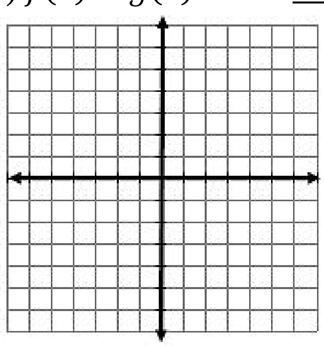
b) Solve algebraically for x: $\frac{1}{2}(x-2)^2 - 2 = 0$



3. $f(x) = 2(x+3)^2 + 2$ and $g(x) = 0$

a) $f(x) = g(x)$ at $x =$ ________

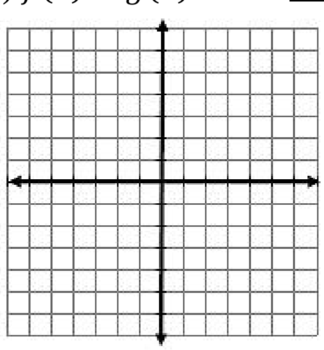
b) Solve algebraically for x: $f(x) = g(x)$



4. $f(x) = (x-1)^2 - 2$ and $g(x) = 0$

a) $f(x) = g(x)$ at $x \approx$ ________

b) Solve algebraically for x to the nearest tenth, $f(x) = g(x)$



[5-16] Solve the following quadratic equations for x.

5. $2(x+3)^2+9=5$

6. $3x^2-11x-4=0$

7. $f(x)=x+1$ and $g(x)=x+5$
Solve: $(f\cdot g)(x)=3$

8. $x^2+4x-6=0$

9. $x^2+2x+5=0$

10. $f(x)=x+4$ and $g(x)=x^2$
Solve: $(f\circ g)(x)-5=6$

11. $f(x)=2x^2+5$ and $g(x)=-6x+2$
Solve: $(f+g)(x)=0$

12. $f(x)=x$ and $g(x)=x-3$
Solve: $(f\cdot g)(x)-7=0$

13. $f(x)=2x-8$ and $g(x)=x^2+x$
Solve: $(f-g)(x)=0$

14. $-3x^2+x+2=0$

15. $f(x)=x+7$ and $g(x)=x^2$
Solve: $20+3(g\circ f)(x)=-34$

16. $16-3(x-5)^2=88$

Math 3 Unit 2 Worksheet 6
Factoring Sum and Difference of Cubes

Name:________________________________
Date:______________________**Per:**_________

Factor completely:

1. $x^3 + 8$
2. $x^3 - y^3$
3. $125 - 8y^3$
4. $64a^3 - 125r^3$
5. $27m^3 + 216n^3$
6. $81y^4 + 3y$

For each equation, write in factored form then determine the real and imaginary solutions.

7. $x^3 - 125 = 0$

Factored Form:

Real solutions:

Imaginary Solutions:

8. $0 = 1000 + x^3$

Factored Form:

Real solutions:

Imaginary Solutions:

9. $8x^3 + 1 = 0$

Factored Form:

Real solutions:

Imaginary Solutions:

10. $64 - 27x^3 = 0$

Factored Form:

Real solutions:

Imaginary Solutions:

11. $f(x) = 250x^4$ and $g(x) = 54x$

Solve: $f(x) - g(x) = 0$

Factored Form:

Real solutions:

Imaginary Solutions:

12. $24x + 81x^4 = 0$

Factored Form:

Real solutions:

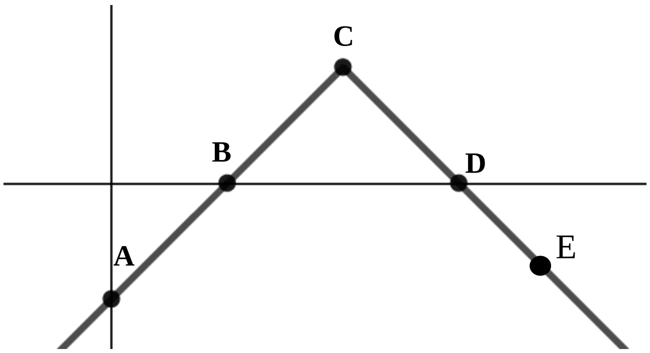
Imaginary Solutions:

13. Is it possible to solve an equation using sum or difference of cubes factoring and have all solutions be imaginary? Please explain your thinking.

Math 3 Unit 2 Worksheet 7
Solutions of Functions

Name:______________________________
Date:____________________**Per:**________

1. The graph of $y = f(x)$ is shown in the graph below.



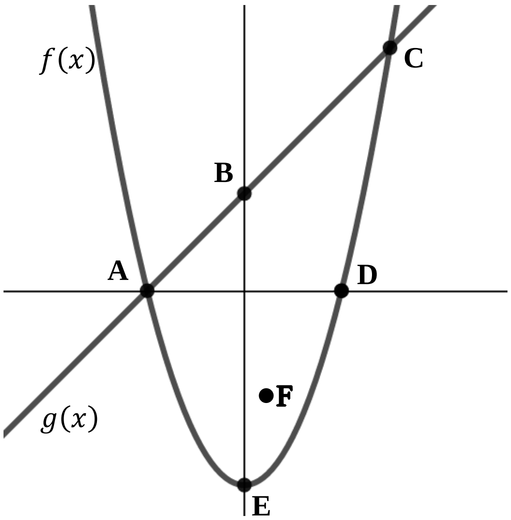
a) List all of the labeled points that are solutions for $f(x) = 0$.

b) List all of the labeled points that are solutions for $y = f(x)$.

c) List all of the labeled points that are solutions for $x = 0$.

d) $f(0) =$

2. The graph of $y = f(x)$ and $y = g(x)$ is shown in the graph below.



a) List all of the labeled points that are solutions for $f(x) = 0$.

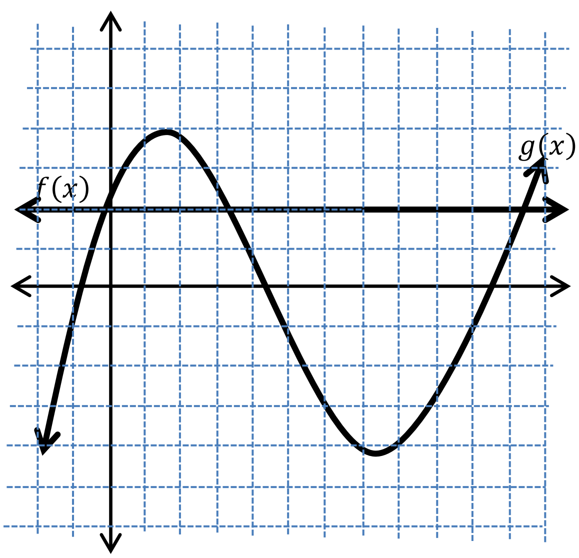
b) List all of the labeled points that are solutions for $g(x) = f(x)$.

c) List all of the labeled points that are solutions for $x = 0$ on the graph of $f(x)$.

d) List all of the labeled points that are solutions for $y = f(x)$.

e) List all of the labeled points that are solutions for $y = g(x)$.

3. The graph of $y = f(x)$ and $y = g(x)$ is shown in the graph below.



a) How many solutions are there for $g(x) = 0$?

b) How many solutions are there for $g(x) = f(x)$?

c) $f(2.5) =$ ____________.

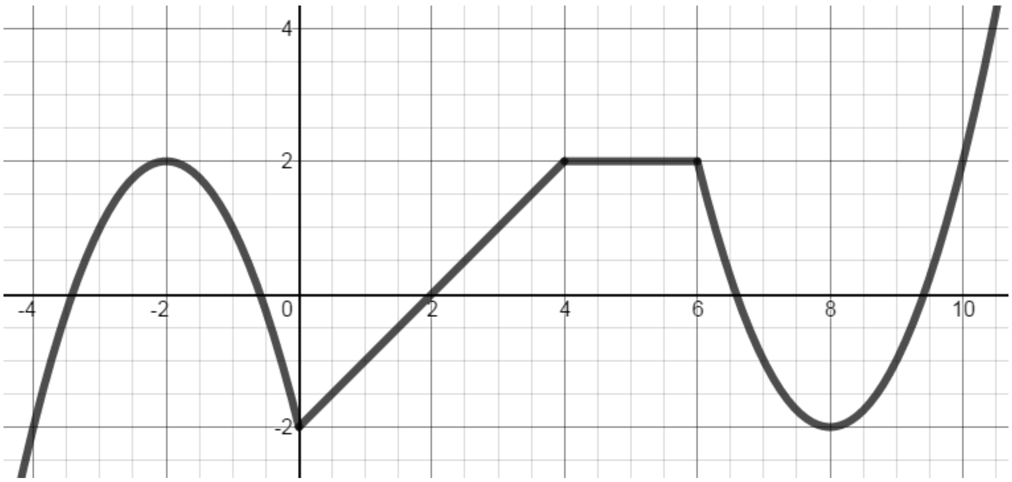
d) How many times does $g(x) = 3.5$?

e) On what approximate interval is $g(x) < -1$?

f) How many roots does $g(x)$ have?

g) Is $g(x) = 0$ between $x = 4$ and $x = 5$?

4. State whether the following statements are correct (A) or incorrect (B)

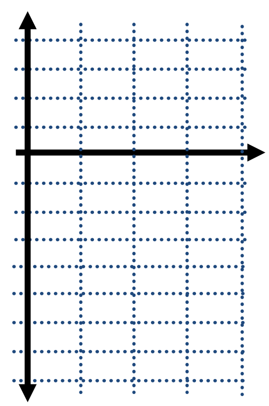


a) $f(4) > 0$ b) $f(-2) < 0$ c) $f(0) = -2$ d) $f(2) = 0$ e) $f(5.123) = 2$

f) $y = 0$ at $f(2)$ g) $f(x) = 0$ between $x = 6$ and $x = 8$ h) $f(x)$ has a relative maximum at $(4, 2)$

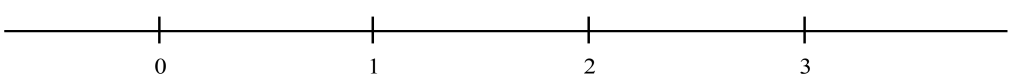
i) $f(x)$ equals zero five times j) . $f(x)$ has a relative minimum at $(0, -2)$

5. The table below shows several points on two continuous functions, $f(x)$ and $g(x)$.

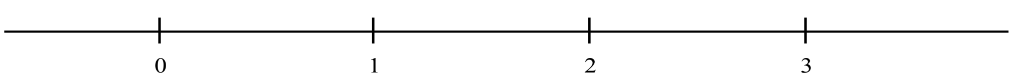


x	0	1	2	3
$f(x)$	–5	–2	1	–5
$g(x)$	–7	–3	2	–1

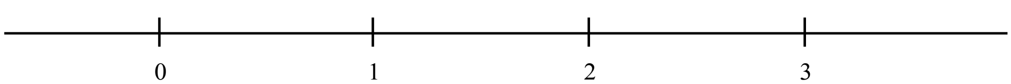
a) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = g(x)$ must exist. If it is not necessary that a solution exists, explain why.



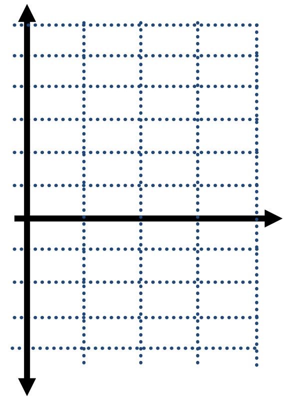
b) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = 0$ must exist. If it is not necessary that a solution exists, explain why.



c) On the number line below, shade the interval(s) between the integers where the solution(s) to $g(x) = 4$ must exist. If it is not necessary that a solution exists, explain why.

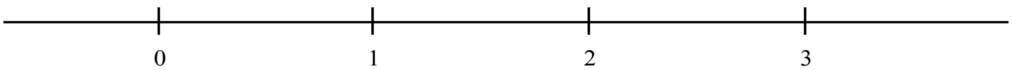


6. The table below shows several points on two continuous functions, $f(x)$ and $g(x)$.

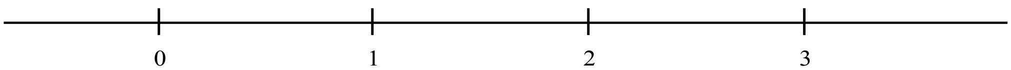


x	0	1	2	3
$f(x)$	5	3	1	–1
$g(x)$	–1	–2	4	6

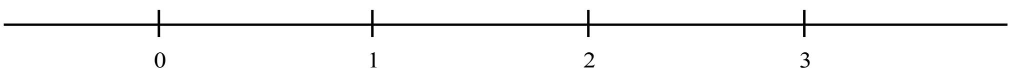
a) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = g(x)$ must exist. If it is not necessary that a solution exists, explain why.



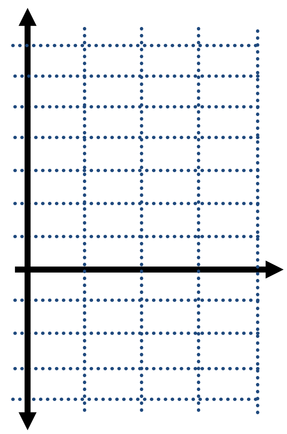
b) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = 0$ must exist. If it is not necessary that a solution exists, explain why.



c) On the number line below, shade the interval(s) between the integers where the solution(s) to $g(x) = 3$ must exist. If it is not necessary that a solution exists, explain why.

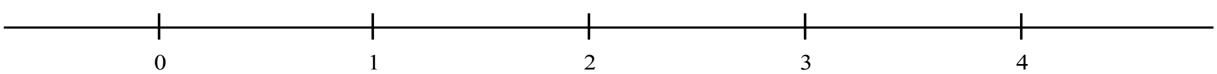


7. The table below shows several points on three continuous functions, $f(x)$, $g(x)$ and $h(x)$.

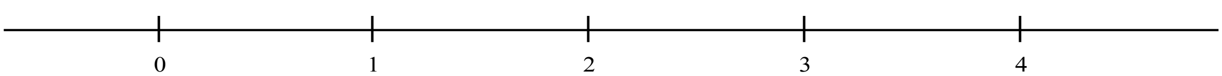


x	0	1	2	3	4
$f(x)$	3	1	3	5	7
$g(x)$	0	–3	1	7	–2
$h(x)$	–4	–1	0	4	–3

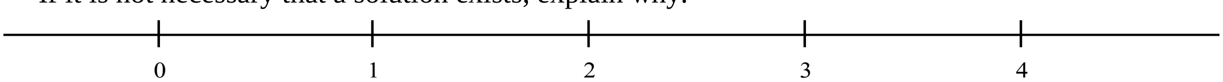
a) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = g(x)$ must exist. If it is not necessary that a solution exists, explain why.



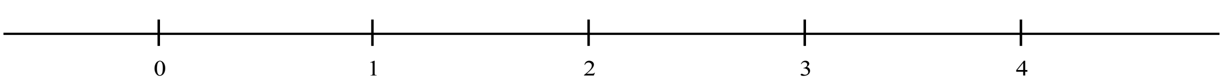
b) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x) = h(x)$ must exist. If it is not necessary that a solution exists, explain why.



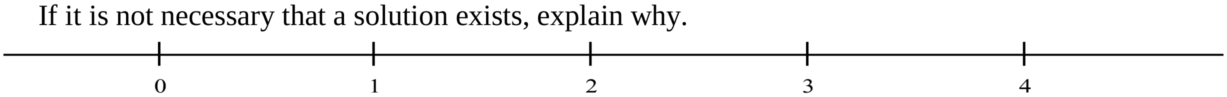
c) On the number line below, shade the interval(s) between the integers where the solution(s) to $g(x) = h(x)$ must exist. If it is not necessary that a solution exists, explain why.



d) On the number line below, shade the interval(s) between the integers where the solution(s) to $g(x) = 2$ and $h(x) = 2$ must exist. If it is not necessary that a solution exists, explain why.



e) On the number line below, shade the interval(s) between the integers where the solution(s) to $h(x) = 0$ must exist. If it is not necessary that a solution exists, explain why.



[8-15]: Solve. Show all work.

8. $x^2 + 2x = 5x + 10$

9. $2x^2 + 4x = 5x + 28$

10. $4x(x + 3) = 12x + 25$

11. $100 + 2(x - 3)^2 = 12$

12. $14 - 3(x + 2)^2 = -106$

13. $3|x + 4| - 17 = 13$

14. $5 - 2|x - 7| = -21$

15. $x^3 - 125 = 0$

Hint: Quadratic formula is not needed for any of the above problems except #16.
All answers may be found below; however, they are in no particular order.

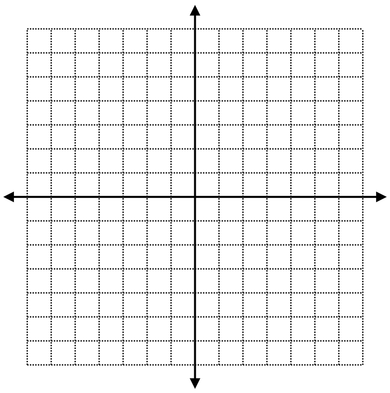
$\{-14, 6\}$ $\{3 \pm 2i\sqrt{11}\}$ $\{-2, 5\}$ $\left\{\pm\frac{5}{2}\right\}$ $\left\{5, \frac{-5 \pm 5i\sqrt{3}}{2}\right\}$ $\{-6, 20\}$ $\left\{-\frac{7}{2}, 4\right\}$ $\{-2 \pm 2\sqrt{10}\}$

Math 3 Unit 2 Worksheet 8 **Name:**_______________________________

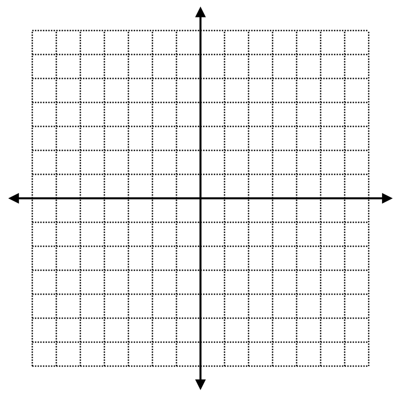
Graphing Systems of Inequalities **Date:**______________________**Per:**_________

Graph the system of inequalities on the graph provided. If the solution exists, then name 2 points in the solution set.

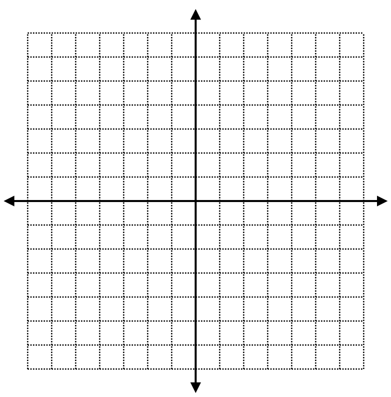
1. $\begin{cases} y \leq 4 - x \\ y > 2x - 3 \end{cases}$



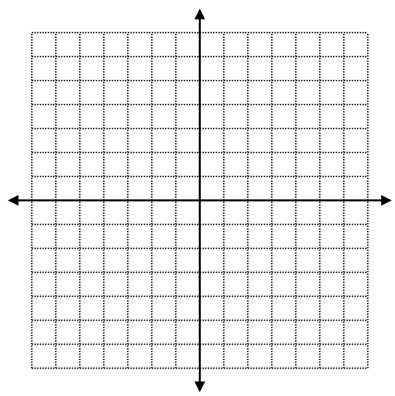
2. $\begin{cases} y < -x^2 + 1 \\ y \leq 2^x - 3 \end{cases}$



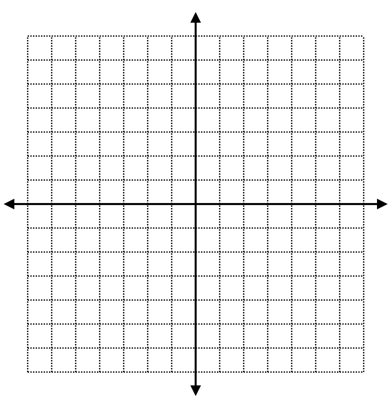
3. $\begin{cases} y \geq -|x + 1| \\ y < 2|x| - 2 \end{cases}$



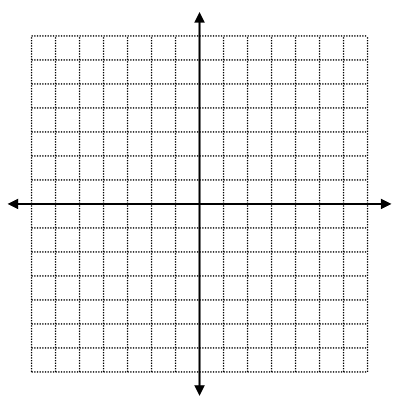
4. $\begin{cases} y \geq 2^x - 1 \\ y < -\frac{1}{2}x - 1 \end{cases}$



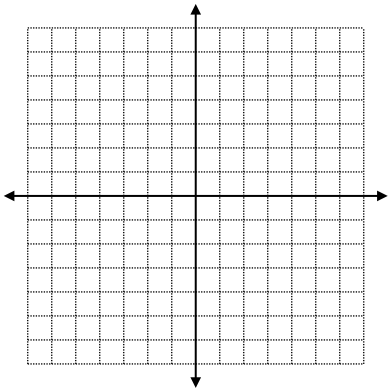
5. $\begin{cases} y \geq |x| - 2 \\ y \leq 2 - |x| \end{cases}$



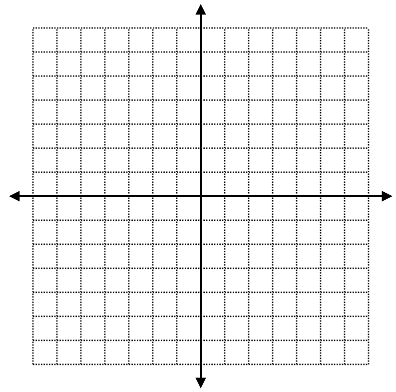
6. $\begin{cases} y < -2 \\ y \geq (x + 1)^2 + 2 \end{cases}$



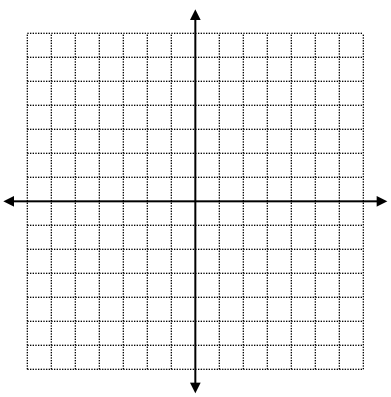
7. $\begin{cases} y < 4 \\ y \leq 2^x \\ y > -x \end{cases}$



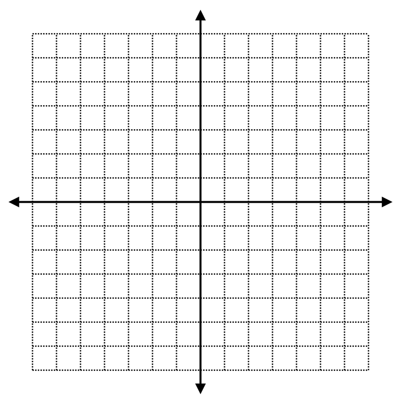
8. $\begin{cases} y \leq 3 - x \\ y > 3 - |x| \end{cases}$



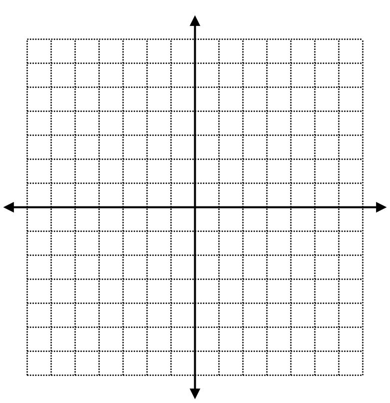
9. $\begin{cases} y \leq -2 \\ y > (x-2)^2 - 1 \end{cases}$



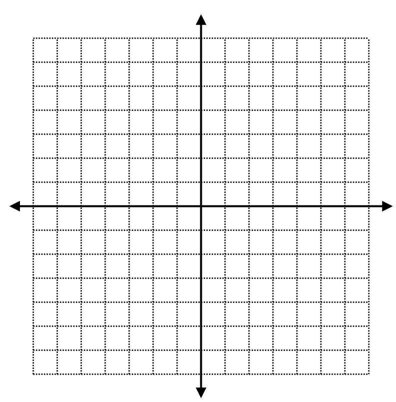
10. $\begin{cases} x > -1 \\ y \geq 2^x \\ y \leq 1 - x \end{cases}$



11. $\begin{cases} y < 0 \\ y \leq 2 - |x| \\ x \geq 0 \end{cases}$



12. $\begin{cases} y \leq |x| - 4 \\ y \geq \frac{1}{2}x^2 - 4 \end{cases}$



[13-21]: Solve the following for x.

13. $2|x+3|-17<-5$

14. $100-3|x+11|\leq 28$

15. $100+3|x+5|<25$

16. $2|x-4|-21\geq -63$

17. $15-|2x+5|>-9$

18. $20+3|x+9|>50$

19. $2x(x+3)=5(8-x)$

20. $50-(x+7)^2=68$

21. $1000+x^3=0$

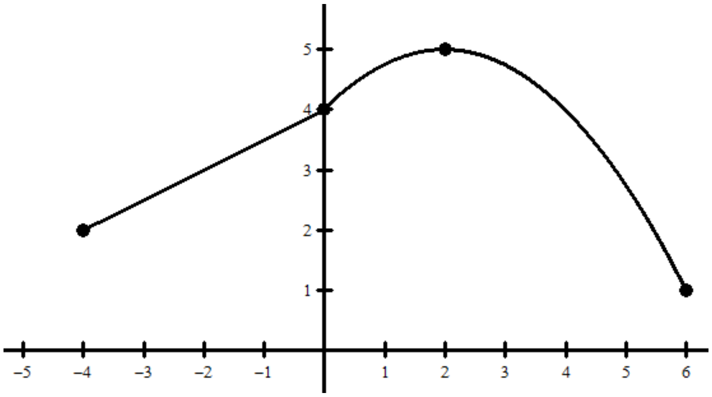
Hint: Quadratic formula is only needed for question 21. All answers may be found below; however, they are in no particular order.

$(-\infty,\infty)$	$\{\emptyset\}$	$\{-7\pm 3i\sqrt{2}\}$	$\left(-\frac{29}{2},\frac{19}{2}\right)$	$\left\{-8,\frac{5}{2}\right\}$	$(-\infty,-35]\cup[13,\infty)$	$\{-10, 5\pm 5i\sqrt{3}\}$	$(-9,3)$	$(-\infty,-19)\cup(1,\infty)$

Math 3 Unit 2
Review

Name:______________________________
Date:____________________ **Per:**_________

1.



(a) State the open interval(s) on which f is increasing.

(b) State the open interval(s) on which f is decreasing.

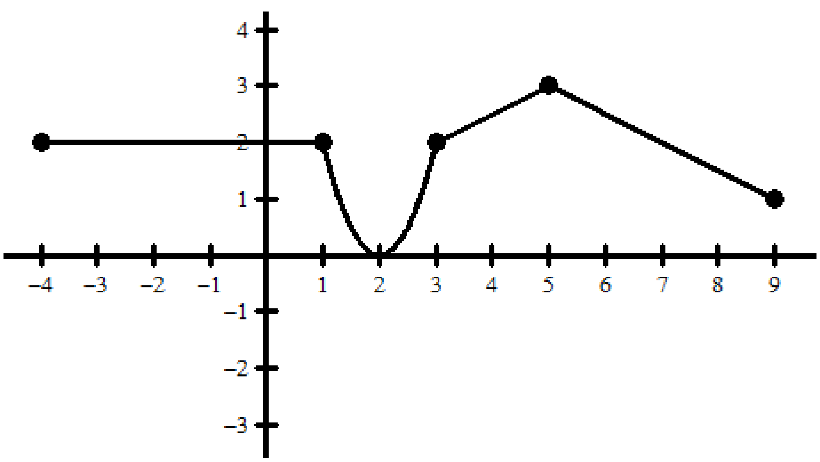
(c) State the domain and range of f.

(d) State the coordinates of any relative minimums of f.

(e) State the coordinates of any relative maximums of f.

(f) Write a two pieced piecewise-defined function, f, that accurately represents the graph of f shown above.

2.



(a) State the open interval(s) on which f is increasing.

(b) State the open interval(s) on which f is decreasing.

(c) State the domain and range of f.

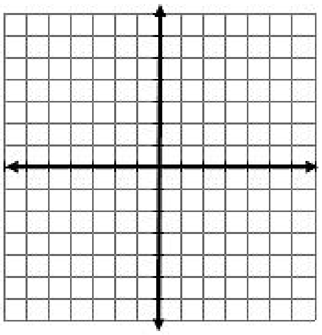
(d) State the coordinates of any relative minimums of f.

(e) State the coordinates of any relative maximums of f.

(f) Write a three pieced piecewise-defined function, f, that accurately represents the graph of f shown above.

3. Graph $f(x)$ and $g(x)$ on the same set of axes. Use the graph and verify algebraically, where $f(x) = g(x)$.

$f(x) = 3|x+1|$ and $g(x) = 6$



[4-7] Solve the following absolute value equations for *x* and graph the solution(s) on a number line. If there is no solution write '*none*' and explain why.

4. $f(x) = |x|$ and $g(x) = 3x + 2$

Solve: $f(g(x)) + 1 = 12$

5. $-\left|\frac{x}{2} - 5\right| = 4$

6. $f(x) = 3x + 2$ and $g(x) = |x|$

Solve: $\frac{2}{5}(g \circ f)(x) = 20$

7. $3\left|\frac{x}{4} - 10\right| = 0$

[8-11] Solve the following absolute value inequalities for *x* and graph the solution(s) on a number line. Write your answer in interval notation. If there is no solution, explain why.

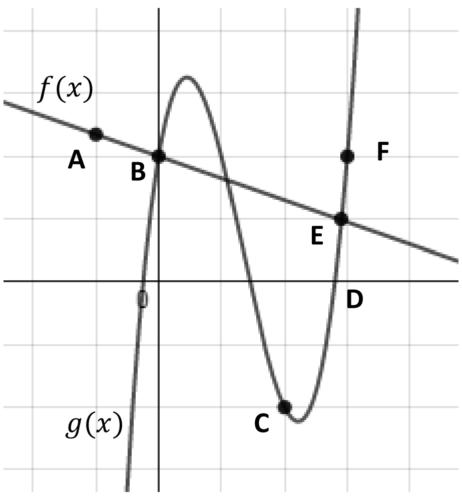
8. $|3x - 10| \le 2$

9. $-\frac{2}{3}|x + 4| < -6$

10. $3\left|\frac{2x}{3}-1\right|+4<-2$

11. $2+2|x-5|\geq 0$

12. The graph of $y=f(x)$ and $y=g(x)$ is shown in the graph below.



a) List all of the labeled points that are solutions for $g(x)=0$.

b) List all of the labeled points that are solutions for $g(x)=f(x)$.

c) List all of the labeled points that are solutions for $x=0$ on the graph of $f(x)$.

d) List all of the labeled points that are solution(s) for $g(x)<f(x)$.

e) List all of the labeled points that are solution(s) for $g(x)>f(x)$.

13. The table below shows several points on two continuous functions, $f(x)$ and $g(x)$

x	0	1	2	3
$f(x)$	0	2	4	5
$g(x)$	–1	3	2	–2

a) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x)=g(x)$ must exist. If no solutions must exist, explain why.

0 1 2 3

b) On the number line below, shade the interval(s) between the integers where the solution(s) to $g(x)=0$ must exist. If no solutions must exist, explain why.

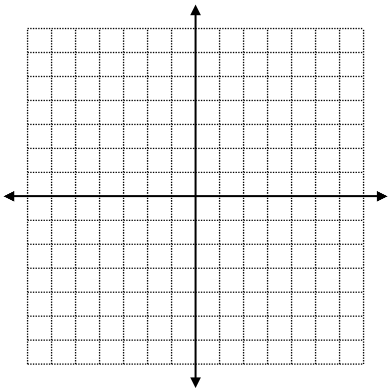
0 1 2 3

c) On the number line below, shade the interval(s) between the integers where the solution(s) to $f(x)=3$ must exist. If no solutions must exist, explain why.

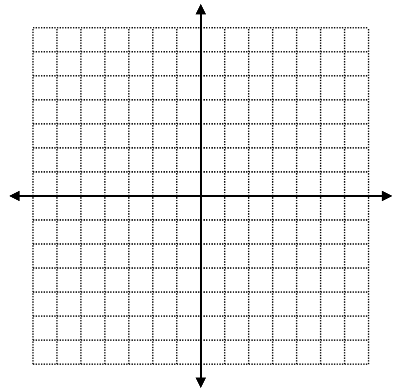
0 1 2 3

[14-17] Graph the system of inequalities on the graph provided.

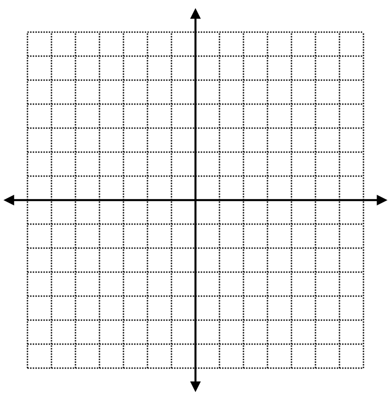
14. $\begin{cases} y \leq 4 \\ y > x \end{cases}$



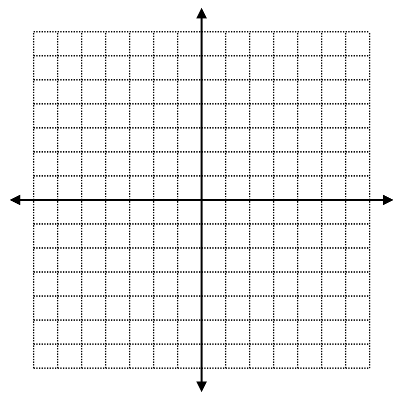
15. $\begin{cases} y > x^2 + 1 \\ y < 1 - x^2 \end{cases}$



16. $\begin{cases} y \leq \frac{1}{3}|x + 2| \\ y \geq -|x| \end{cases}$



17. $\begin{cases} y > 2^x - 2 \\ y < -x + 1 \end{cases}$



Solve for x.

18. $3(x - 2)^2 + 15 = 90$

19. $f(x) = x^2$ and $g(x) = x + 3$
Solve: $-2f\big(g(x)\big) + 30 = -212$

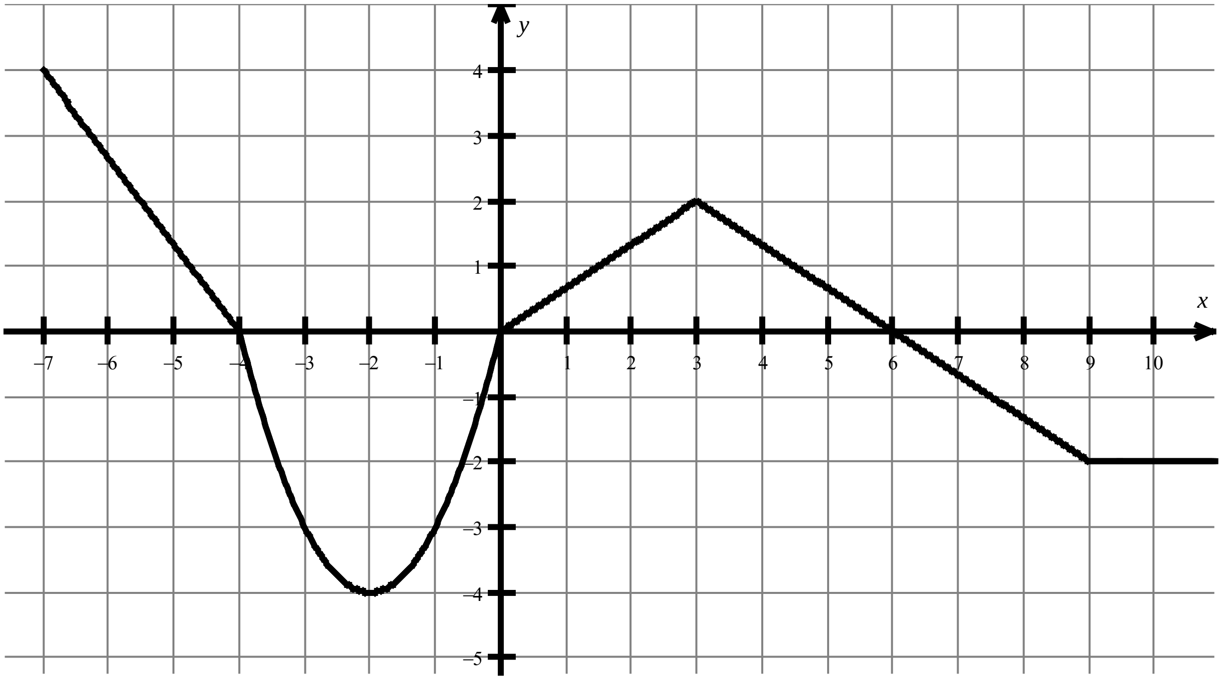
20. $2(x - 5)^2 - 6 = 120$

21. $14x = 24 - 3x^2$

22. $26x + 36 = 6x - x^2$

23. $f(x) = 8x - 4$ and $g(x) = 7x^2$
Solve: $(f - g)(x) = 0$

24. Use the graph of $f(x)$ below to answer the following questions.



True or False:

a) $f(5) > 1$

b) $f(8) < -1$

c) $f(x) = 1$ between $x = 5$ and $x = 6$

d) $f(x) = 1$ between $x = 0$ and $x = 2$

e) $f(0) = 0$

f) $f(-7) = 4$

g) $f(3.743) = 1$

h) $f(9.324) = -2$

i) $f(x)$ has a relative maximum at $(-2, -4)$

j) $f(x)$ has a relative maximum at $(3, 2)$

k) $f(x)$ has a relative minimum at $(9, -2)$

l) $f(x)$ has a relative minimum at $(-2, -4)$