

**Intermediate Algebra Extended  
Final Exam Review Questions**

1.
  - a) Graph the equation  $4x - 3y = 2$ .
  - b) What is the  $x$ -intercept?
  - c) What is the  $y$ -intercept?
  - d) What is the slope of this line?
  
2.
  - a) Find the slope of the line joining the points  $(-3, 5)$  and  $(7, 2)$ .
  - b) Find the equation of this line.
  
3. The equations  $3x + 5y = 2$  and  $6x + 10y = 6$  represent two lines that are
  - a) Overlapping
  - b) Parallel
  - c) Intersecting
  
4. Find the equation of the line through the point  $(-8, 4)$  with  $m = \frac{2}{7}$ .
  
5. Find the slope and  $y$ -intercept of the line  $5x - 2y = 4$ .
  
6. Find the equation of the line through the point  $(-7, 1)$ , and a) **parallel** ( $\parallel$ ), b) **perpendicular** ( $\perp$ ), to the line  $2x + 5y = 3$ .
  
7. Graph the solution set of  $4x - 2y \leq 6$ .
  
8. Simplify  $(-yx^2y^{-4}z)^3(-2x^{-\frac{1}{2}}y^4z^{-1})^4$ . Write all solutions using only positive exponents.
  
9. Write  $(7xy^3)^{\frac{1}{4}}$  in simplest radical form. Assume all variables are positive.
  
10. Write  $-3(x^3y^2)^{\frac{1}{6}}$  in simplest radical form. Assume all variables are positive.
  
11. Write in simplest form using rational exponents.
  - a)  $4(\sqrt[8]{x^3y^5})$
  - b)  $\sqrt[7]{49x^4y^6}$
  
12. Simplify. Assume all variables are positive real numbers.
  - a)  $\sqrt{48x^9y^4z}$
  - b)  $\sqrt{\frac{128x^{11}y^{10}z}{2xy^2z^4}}$
  - c)  $\frac{12}{\sqrt{8x}}$
  
13. Simplify  $12\sqrt{45} - 5\sqrt{80} + 3\sqrt{20}$ .

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14. Simplify:

a)  $5\sqrt{6}(3\sqrt{2}-4\sqrt{3})$       b)  $(4\sqrt{2}+3\sqrt{5})(4\sqrt{2}-3\sqrt{5})$   
c)  $(3\sqrt{2x}-4\sqrt{7x})(5\sqrt{3x}+2\sqrt{2x})$       d)  $(4-\sqrt{7})^2$       e)  $\frac{3\sqrt{5}+2\sqrt{6}}{2\sqrt{6}+3\sqrt{3}}$

15. Perform the indicated operation.

a)  $i^{123}$       b)  $\sqrt{-9}\sqrt{-8}$       c)  $\sqrt{-9}+\sqrt{-81}$       d)  $(18-2i)-(4-5i)$   
e)  $(5+3i)(7-2i)$       f)  $(4-7i)^2$       g)  $\frac{3+2i}{7-3i}$

16. Solve each equation.

a)  $9x^2 = -18$       b)  $x^2 - 4x + 5 = 0$   
c)  $3x^2 + 2x + 5 = 0$       d)  $x^2 + 6x + 8 = 0$

17. Use the discriminant to discuss the nature of the roots of  $5x^2 - 2x + 3 = 0$ .

18. Solve:

a)  $x + \sqrt{x-4} = 4$       b)  $\sqrt{2x+7} + \sqrt{x+3} = 1$       c)  $x^4 - x^2 - 12 = 0$

19. The graph of  $y = -4x^2 + 2x - 3$  is a \_\_\_\_\_.

- a) Is its vertex a maximum or a minimum point?
- b) What are the coordinates of its vertex?
- c) What is the  $y$ -intercept of the graph?
- d) What, if any, are the  $x$ -intercepts of the graph?

20. Solve for  $x$ :

a)  $x^2 - 8x + 15 < 0$       b)  $(2x+3)(x-5)(2x-4) \geq 0$

21. Define each of the following:

- a) 2 linear equations are dependent      b) 2 linear equations are independent
- c) 2 linear equations are inconsistent

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22. Graph the system of equations, then solve it algebraically.

$$2x + 3y = -5$$

$$4x - 2y = 10$$

23. Solve each system of equations:

a)  $3x + 5y = 2$   
 $4x - 2y = 5$

b)  $2x - 3y = 4$   
 $4x - 6y = 6$

c)  $x - 3y = 5$   
 $2x - 6y = 10$

24. Solve the system of equations.

$$3x - 2y + 4z = 6$$

$$2x + 3y - 5z = -8$$

$$5x - 4y + 3z = 7$$

25. Solve the system graphically.

$$2x - 4y \geq 5$$

$$3x + y \leq 2$$

26. A concert sold 884 tickets. Tickets cost \$5 and \$8. If the total receipts were \$6,376, how many of each ticket were sold?

27. Find the domain and range of the relation:  
 $\{(5, 7), (2, -3), (4, -2), (5, -1), (8, -3), (3, 7)\}$ . Also find the domain and range of the inverse of this relation.

28. If  $f(x) = 4x^2 - 5x + 3$ , find a)  $f(-8)$  and b)  $\frac{f(x+h) - f(x)}{h}$ .

29. Find the inverse of the function  $f(x) = \frac{3x+5}{7}$ .

30. a) Write  $\log_3 81 = 4$  in exponential form.

b) Write  $4^{-2} = \frac{1}{16}$  in logarithmic form.

31. Write as a sum or difference of logarithms:  $\log_b \left( \frac{x^5 y^2 z^{1/3}}{w^3} \right)$

32. Write  $5\log_b x - 3\log_b y - \frac{2}{3}\log_b z + 2\log_b w$  as a single logarithm with a coefficient of 1.

33. Find: a)  $\log_{10} 257.36$       b)  $\ln 0.00235$       c)  $\log_7 429$

34. If  $\log x = 4.2531$ , find  $x$ .

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35. Graph each of the following functions:

a)  $f(x) = \left(\frac{2}{3}\right)^x$       b)  $f(x) = 9^x$       c)  $f(x) = \log_7 x$       d)  $f(x) = \log_{\frac{2}{3}} x$

36. Solve for  $x$ :

a)  $9^{4x-5} = 9^{-3x+2}$       b)  $16^{2x-1} = 4^{5x-1}$       c)  $\log_b(2x^2 - 3x + 1) = \log_b(2x^2 + 4x - 8)$

37. Find  $x$  if  $5^{6x-2} = 3$ .

38. Solve for  $x$ .

a)  $\log_2(8x-2) = 4$       b)  $\log_2(2x-3) = 5 - \log_2 x$

39. Solve the inequality and express the solution set using interval notation.

a)  $\frac{2x-3}{4} > 6$       b)  $\frac{x-3}{-5} < -2$       c)  $\frac{1}{3}x - \frac{1}{6} \leq \frac{1}{6}x - \frac{1}{2}$

40. For \$19.95 per month you can rent an unlimited number of DVD movies through an Internet rental service. You can rent the same DVDs at a local store for \$4.95 each. How many movies would you have to rent per month for the Internet service to be the better deal?

41. Solve each compound inequality and express the solution set using interval notation.

a)  $x - 5 > 6$  or  $2 - x > 4$       b)  $-4 \leq x - 4 \leq 1$       c)  $0 \leq \frac{3-2x}{2} < 5$

42. Write each union or intersection of intervals as a single interval, if possible.

a)  $(-3, \infty) \cup (-6, \infty)$       b)  $(-\infty, -2) \cap (-\infty, 1)$       c)  $(-\infty, -2] \cup (2, \infty)$

43. The length of a rectangle is 20 meters longer than the width. The perimeter must be between 80 and 100 meters. What are the possible values for the width of the rectangle?

44. Solve each absolute value equation.

a)  $|2(x+3)| = 15$       b)  $4 - 3|x-2| = -8$       c)  $2|x-3| = 3|x-4|$

45. Solve each absolute value inequality and express the solution set using interval notation.

a)  $|x-5| \geq 1$       b)  $\frac{1}{3}|2x-1| < 1$

46. Use Interval notation to state the domain and range of

a)  $f(x) = \ln x$       b)  $f(x) = \ln(x+1)$       c)  $f(x) = \ln(x) + 1$

and find the  $x$ -intercepts of each of the above.

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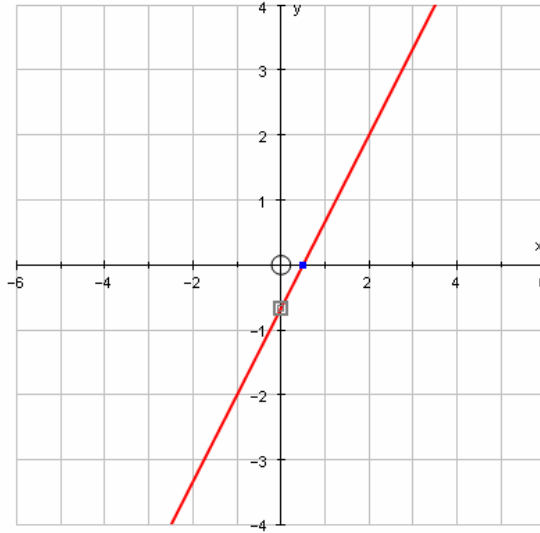
**SOLUTIONS**

**1.**

$$4x - 3y = 2$$

$$-3y = -4x + 2$$

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



$$4x - 3(0) = 2$$

**b)**  $x = \frac{2}{4} = \frac{1}{2}$

$$\boxed{x\text{-int.} = \left(\frac{1}{2}, 0\right)}$$

**c)**  $y = \frac{4}{3}x - \frac{2}{3}$   
 $\boxed{y\text{-int.} = \left(0, -\frac{2}{3}\right)}$

**d)**  $\boxed{m = \frac{4}{3}}$

$$m = \frac{2-5}{7+3} = \boxed{-\frac{3}{10}}$$

**2.**  $2 = -\frac{3}{10}(7) + b$

$$2 = -\frac{21}{10} + b$$

$$b = \frac{41}{10} \Rightarrow \boxed{y = -\frac{3}{10}x + \frac{41}{10}}$$

$$-2(3x + 5y = 2) \Rightarrow -6x - 10y = -4$$

**3.**  $6x + 10y = 6$        $\underline{6x + 10y = 6}$

$$\boxed{0 \neq 2 \quad \therefore \text{Parallel}}$$

$$4 = \frac{2}{7}(-8) + b$$

**4.**  $b = 4 + \frac{16}{7}$

$$b = \frac{44}{7} \Rightarrow \boxed{y = \frac{2}{7}x + \frac{44}{7}}$$

$$5x - 2y = 4$$

$$-2y = -5x + 4$$

**5.**  $y = \frac{5}{2}x - 2 \Rightarrow \boxed{m = \frac{5}{2} \quad b = -2}$

$$\boxed{y\text{-int.} = (0, -2)}$$

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$$m = m_{\parallel} = -\frac{2}{5}$$

$$a) (\parallel) 1 = -\frac{2}{5}(-7) + b$$

$$b) (\perp) 1 = \frac{5}{2}(-7) + b$$

$$6. \quad 1 = \frac{14}{5} + b$$

$$1 = -\frac{35}{2} + b$$

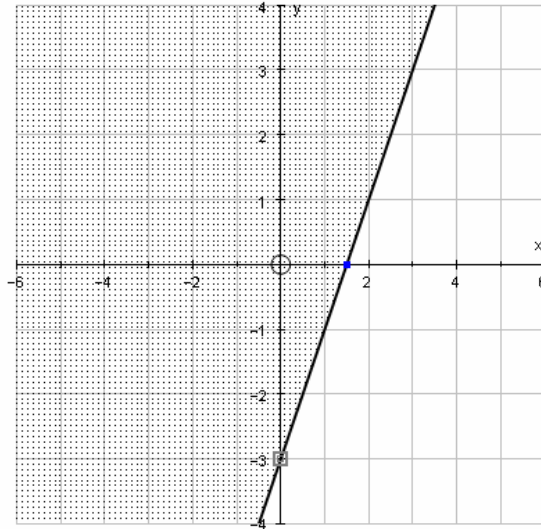
$$b = -\frac{9}{5}$$

$$b = \frac{37}{2}$$

$$\boxed{y = -\frac{2}{5}x - \frac{9}{5}}$$

$$\boxed{y = \frac{5}{2}x + \frac{37}{2}}$$

7.



$$8. \quad (-yx^2y^{-4}z)^3(-2x^{-\frac{1}{2}}y^4z^{-1})^4 = (-y^3x^6y^{-12}z^3)(16x^{-2}y^{16}z^{-4}) = \boxed{\frac{-16x^4y^7}{z}}$$

$$9. \quad \boxed{\sqrt[4]{7xy^3}}$$

$$10. \quad \boxed{-3(\sqrt[6]{x^3y^2})}$$

$$11. \quad a) \boxed{4(x^3y^5)^{\frac{1}{8}}} \quad b) \boxed{(49x^4y^6)^{\frac{1}{7}}}$$

$$12. \quad a) \boxed{4x^4y^2\sqrt{3xz}}$$

$$b) \quad \boxed{\frac{8x^5y^4z^{\frac{1}{2}}}{z^2}}$$

$$c) \quad \boxed{\frac{3\sqrt{2x}}{x}}$$

$$13. \quad \boxed{22\sqrt{5}}$$

$$14. \quad a) \quad \boxed{30\sqrt{3} - 60\sqrt{2}}$$

$$b) \quad \boxed{-13}$$

$$c) \quad \boxed{15x\sqrt{6} + 12x - 20x\sqrt{21} - 8x\sqrt{14}}$$

$$d) \quad \boxed{23 - 8\sqrt{7}}$$

$$e) \quad \boxed{-2\sqrt{30} + 3\sqrt{15} + 6\sqrt{2} - 8}$$

$$15. \quad a) \quad \boxed{-i}$$

$$b) \quad \boxed{-6\sqrt{2}}$$

$$c) \quad \boxed{12i}$$

$$d) \quad \boxed{14 + 3i}$$

$$e) \quad \boxed{41 + 11i}$$

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f)  $\boxed{-33 - 56i}$

g)  $\boxed{\frac{15}{58} + \frac{23}{58}i}$

16. a)  $\boxed{x = \pm i\sqrt{2}}$     b)  $\boxed{2 \pm i}$     c)  $\boxed{\frac{-1 \pm i\sqrt{14}}{3}}$     d)  $\boxed{x = \{-4, -2\}}$

17.  $\boxed{D = b^2 - 4ac = -56. \text{ Since } D < 0, \text{ there are 2 complex roots.}}$

18. a)  $\boxed{x = 4}$     b)  $\boxed{x = -3}$     c)  $\boxed{x = \{\pm 2, \pm i\sqrt{3}\}}$

19. The graph is a parabola.

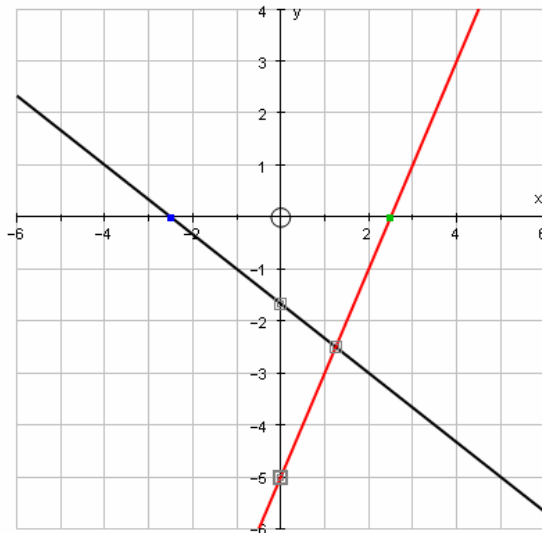
a)  $\boxed{\text{Maximum, } a < 0}$     b)  $\boxed{\left(\frac{1}{4}, -\frac{11}{4}\right)}$     c)  $\boxed{(0, -3)}$     d)  $\boxed{\text{None}}$

20. a)  $\boxed{3 < x < 5}$   
 $\boxed{(3, 5)}$     b)  $\boxed{-\frac{3}{2} \leq x \leq 2 \text{ or } x \geq 5}$   
 $\boxed{\left[-\frac{3}{2}, 2\right] \cup [5, \infty)}$

21. a) **The lines coincide. There are infinitely many solutions.**  
 b) **The lines intersect at one point.**  
 c) **The lines are parallel. There is no solution.**

22.

$\boxed{\text{Solution: } \left(\frac{5}{4}, -\frac{5}{2}\right)}$

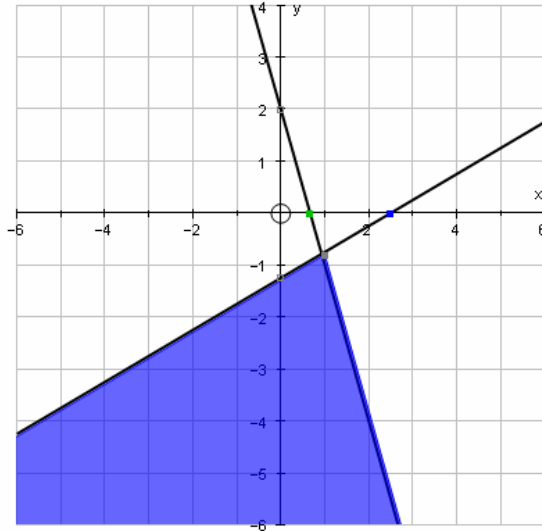


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23. a)  $\boxed{\text{Solution: } \left(\frac{29}{26}, -\frac{7}{26}\right)}$     b)  $\boxed{0 \neq -2}$   
*No solution*    c)  $\boxed{\text{Dependent system}}$   
*Infinitely many solutions*

24.  $\boxed{\text{Solution: } (0, -1, 1)}$

25.



26.  $\boxed{232 \text{ @ } \$5.00}$   
 $\boxed{652 \text{ @ } \$8.00}$

27.  $\boxed{\text{Domain of relation} = \{2, 3, 4, 5, 8\} \quad \text{Range of relation} = \{-3, -2, -1, 7\}}$   
 $\boxed{\text{Domain of inverse} = \{-3, -2, -1, 7\} \quad \text{Range of inverse} = \{2, 3, 4, 5, 8\}}$

28. a)  $\boxed{f(-8) = 299}$

b)  $\boxed{8x + 4h - 5}$

29.  $\boxed{f^{-1}(x) = \frac{7x - 5}{3}}$

30. a)  $\boxed{3^4 = 81}$

b)  $\boxed{\log_4 \frac{1}{16} = -2}$

31.  $\boxed{5 \log_b x + 2 \log_b y + \frac{1}{3} \log_b z - 3 \log_b w}$

32.  $\boxed{\log_b \left( \frac{x^5 w^2}{y^3 z^{\frac{2}{3}}} \right)}$

33. a)  $\boxed{2.4105}$

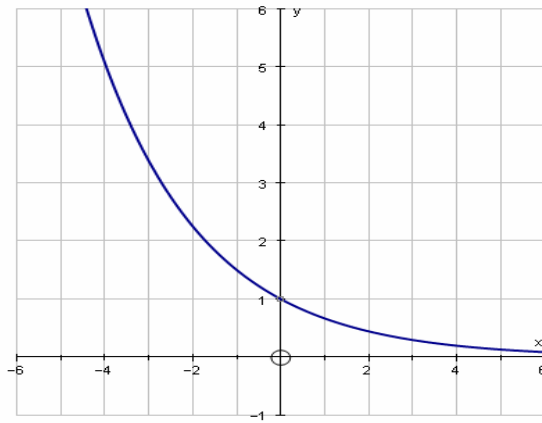
b)  $\boxed{-6.0533}$

c)  $\boxed{3.1150}$

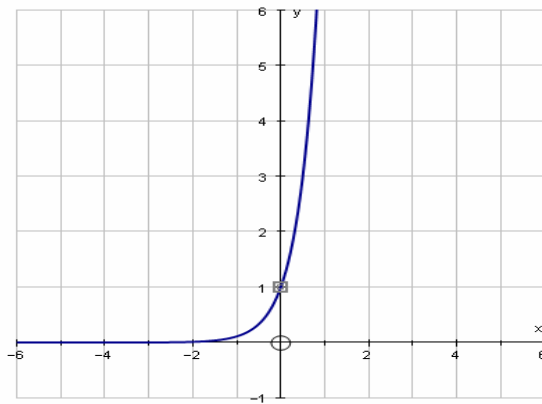
34.  $\boxed{x = 17910.1820}$

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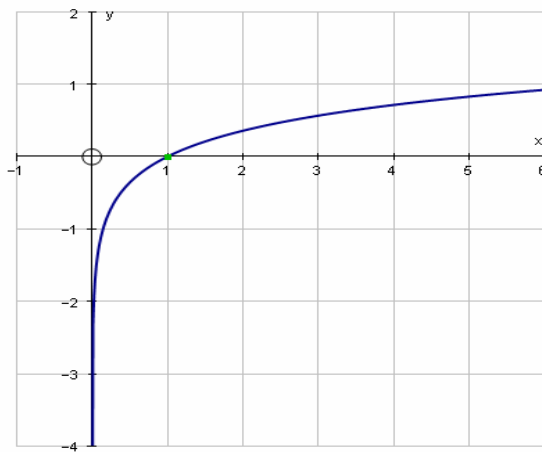
35. a)



35. b)

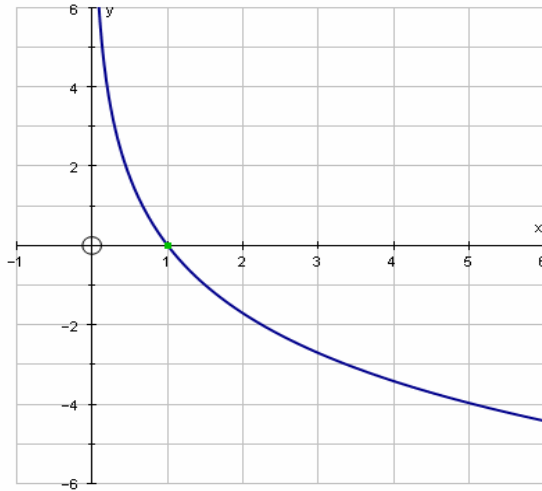


35. c)



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35. d)



36. a)  $x=1$       b)  $x=-1$

c)  $x = \frac{9}{7}$  (Check that both sides of the equation are defined)

37.  $x = \frac{\frac{\ln 3}{6} + 2}{\ln 5} \approx 0.4471$

38. a)  $x = \frac{9}{4}$       b)  $x = \frac{3 + \sqrt{265}}{4} \approx 4.1897$

39. a)  $\left(\frac{27}{2}, \infty\right)$       b)  $(13, \infty)$       c)  $(-\infty, -2)$

40. 5 or more      41. a)  $(-\infty, -2) \cup (11, \infty)$       b)  $[0, 5]$       c)  $\left(-\frac{7}{2}, \frac{3}{2}\right]$

42. a)  $(-6, \infty)$       b)  $(-\infty, -2)$       c)  $(-\infty, -2] \cup (2, \infty)$

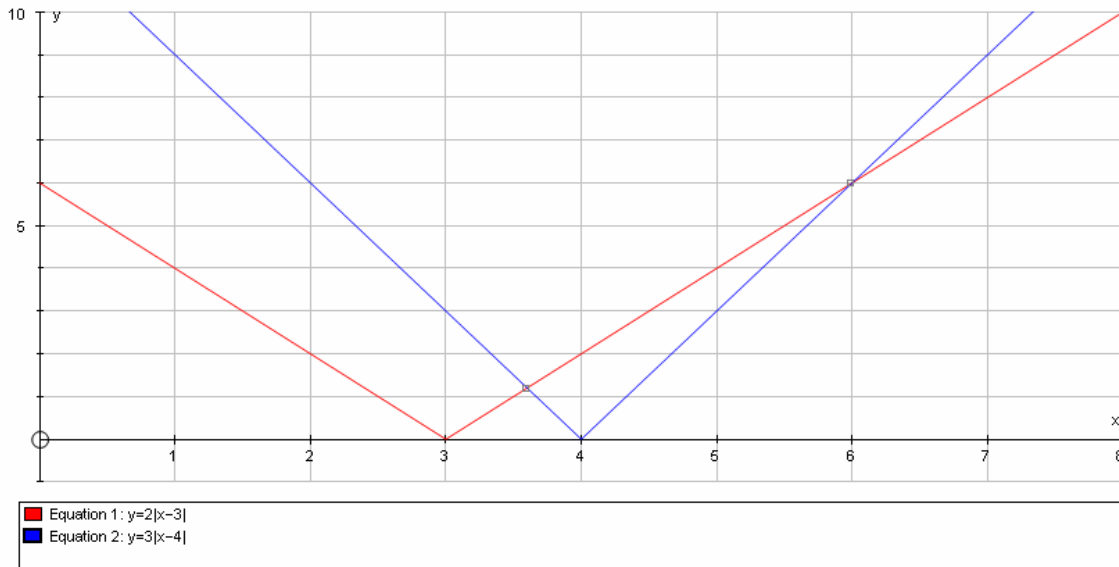
43. Let  $w = \text{width} \Rightarrow 10 < w < 15$       44. a)  $\left\{-\frac{21}{2}, \frac{9}{2}\right\}$       b)  $\{-2, 6\}$       c)  $\left\{\frac{18}{5}, 6\right\}$

45. a)  $(-\infty, 4] \cup [6, \infty)$       b)  $(-1, 2)$

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Domain of  $f(x) = \ln x : (0, \infty)$       Range of  $f(x) = \ln x : (-\infty, \infty)$   
 $x$ -intercept :  $(1, 0)$   
 Domain of  $f(x) = \ln(x+1) : (-1, \infty)$       Range of  $f(x) = \ln(x+1) : (-\infty, \infty)$   
**46.**  $x$ -intercept :  $(0, 0)$   
 Domain of  $f(x) = \ln(x)+1 : (0, \infty)$       Range of  $f(x) = \ln(x)+1 : (-\infty, \infty)$   
 $x$ -intercept :  $\left(\frac{1}{e}, 0\right)$

**Graph of 44c**



**Graphs of 46a, b, & c.**

