

Math 1030, Exam #1, Summer 2014

Name

KEY

**Instructions:** Show all work. Use exact answers unless specifically asked to round. Reduce as much as possible. Be sure to answer all parts of each question.

1. Use the point slope form of a line to find the equation of the line passing through the points (3,1) and (-2,16). Put your final answer in slope-intercept form. (10 points)

$$m = \frac{16-1}{-2-3} = \frac{15}{-5} = -3$$

$$y-1 = -3(x-3)$$

$$y-1 = -3x+9$$

$$y = -3x+10$$

2. Find the equation of the vertical line through the point (1,-4). (5 points)

$$x = 1$$

3. Determine if the pairs of lines below are parallel, perpendicular or neither. (7 points each)

$$L_1: y = 3x - 6$$

a.  $L_2: y = -\frac{1}{3}x + 11$

$$m_1 = 3$$

$$m_2 = -\frac{1}{3}$$

$$3(-\frac{1}{3}) = -1$$

perpendicular

b.  $L_1: 3x - 6y = 10$   
 $L_2: -x + 2y = 4$

$$\frac{-6y}{-6} = \frac{-3x+10}{-6} \Rightarrow y = \frac{1}{2}x - \frac{5}{3}$$

$$\frac{2y}{2} = \frac{x+4}{2} \Rightarrow y = \frac{1}{2}x + 2$$

$$m_1 = \frac{1}{2} \quad m_2 = \frac{1}{2}$$

parallel

- c.  $L_1$ : passing through (2,1), and (4,5)  
 $L_2$ : passing through (-3,4) and (5,11)

$$m_1 = \frac{5-1}{4-2} = \frac{4}{2} = 2$$

$$m_2 = \frac{11-4}{5-(-3)} = \frac{7}{8}$$

neither

4. Find the equation of the line parallel to the line  $y = \frac{1}{2}x + 4$  and passing through the point (6,-1). (8 points)

$$m = \frac{1}{2}$$

$$y + 1 = \frac{1}{2}(x - 6)$$

$$y + 1 = \frac{1}{2}x - 3$$

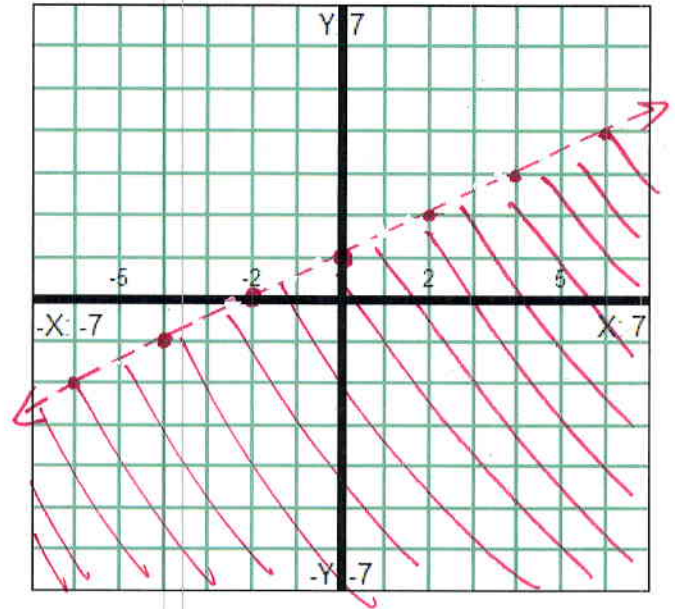
$$\boxed{y = \frac{1}{2}x - 4}$$

5. Find the equation of the line perpendicular to the line  $x = 5$ , passing through the point (3,2). (6 points)

$$y = 2$$

6. Graph the linear inequality  $y < \frac{1}{2}x + 1$  on the graph below. Be sure to shade the side of the line that satisfies the inequality. (8 points)

Check origin  
 $(0,0)$   
 $0 < \frac{1}{2}(0) + 1$   
 $0 < 1$  true

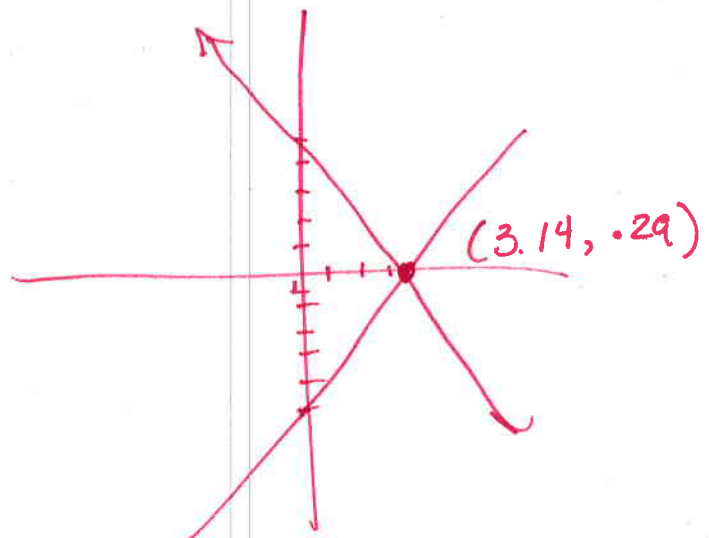


7. Solve the system of equations  $\begin{cases} y = 2x - 6 \\ 3x + 2y = 10 \end{cases}$  graphically. Sketch the graph you obtain from your calculator and label the point of intersection with its coordinates, if it exists. Round your answer to two decimal places if necessary. (10 points)

$$\frac{2y}{2} = \frac{-3x + 10}{2}$$

$$y = -\frac{3}{2}x + 5$$

$\approx (3.14, .29)$



8. Solve the system of equations  $\begin{cases} x + y = 10 \\ 2x - 3y = 25 \end{cases}$  by using substitution. State your answer as a coordinate point. (10 points)

$$\begin{aligned}
 y &= -x + 10 \\
 2x - 3(-x + 10) &= 25 \\
 2x + 3x - 30 &= 25 \\
 5x - 30 &= 25 \\
 5x &= 55 \\
 x &= 11 \\
 y &= -11 + 10 = -1
 \end{aligned}$$

$$(11, -1)$$

9. Solve the system of equations  $\begin{cases} 5x - 3y = 45 \\ 3x + 4y = 48 \end{cases}$  by elimination by addition. State your answer as a coordinate point. (10 points)

$$\begin{aligned}
 20x - 12y &= 180 \\
 9x + 12y &= 144 \\
 \hline
 29x &= 324 \\
 \frac{29x}{29} &= \frac{324}{29} \\
 x &= \frac{324}{29}
 \end{aligned}$$

$$\left(\frac{324}{29}, \frac{105}{29}\right)$$

$$3\left(\frac{324}{29}\right) + 4y = 48$$

$$4y = 48 - \frac{972}{29}$$

$$4y = \frac{420}{29}$$

$$y = \frac{105}{29}$$

10. Solve the system of equations  $\begin{cases} -x + 3y = 12 \\ 2x - 6y = -24 \end{cases}$  by any method. Clearly state the solution, if it exists. (8 points)

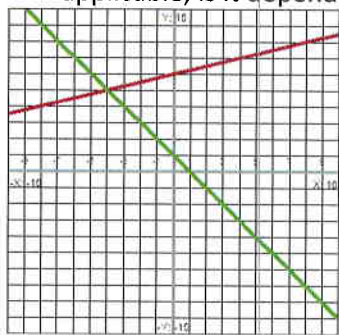
$$\begin{array}{r} -2x + 6y = 24 \\ 2x - 6y = -24 \\ \hline 0 = 0 \end{array}$$

any point that satisfies the line

$-x + 3y = 12$  is a solution

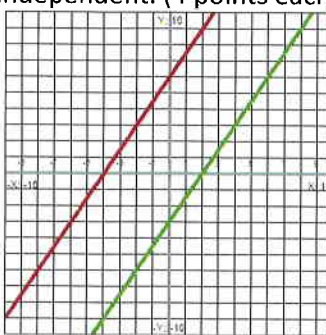
infinite # of solutions

11. For each of the graphs below, state whether the solution is consistent or inconsistent, and if applicable, is it dependent or independent. (4 points each)



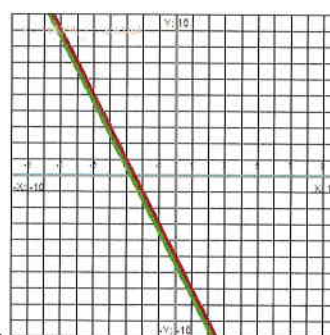
a.

consistent  
independent



b.

inconsistent



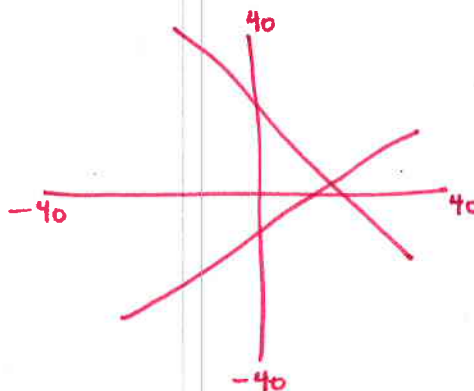
c.

consistent  
dependent

12. Solve the equation  $2x - 3(x - 4) + 5 = \frac{4}{3}(x - 12) + \frac{1}{2}$  graphically. State the solution rounded to two decimal places. Sketch the graph obtained from your calculator. (10 points)

$$x \approx 13.928571$$

$$\approx 13.93$$



13. Give an example of a system of equations that would be more easily solved with elimination by addition instead of by substitution. Explain your reasoning. (6 points)

$$\begin{cases} 2x + 7y = 20 \\ 5x - 6y = 42 \end{cases}$$

no coefficients are one.

will introduce fractions if using substitution method

14. Why is an inconsistent system neither dependent nor independent? (6 points)

inconsistent means "no solutions"  
but dependent & independent  
characterize the type of solution.

15. There are three forms of the equation of a line that we learned in Chapter 3: the standard form, the slope-intercept form, and the point-slope form. Give an example of an equation in each form (they do not need to be the same line), and label each form clearly. (9 points)

Standard:  $3x + 2y = 12$

Slope-intercept:  $y = \frac{1}{2}x + 7$

point slope:  $y - 6 = 3(x + 1)$

answers will vary

16. Give one example of a situation in which it might be necessary to solve a system of equations. (4 points)

answers will vary, but any situation that involves 2 unknowns will do, such as putting money into 2 investments, 2 ticket prices, cost of two products, mixtures, etc.