

Solutions to Study Guide for Final Exam

1. Solve the system by substitution.

$$\begin{aligned} 6x - 5y &= -8 \\ x + 3y &= 14 \end{aligned}$$

- a) Circle the correct description of the system.
- i. Dependent system
 - ii. One solution system
 - iii. Inconsistent system.
- b) What is the solution of the system of equations? Circle the correct choice below, and if necessary, fill in the answer box to complete your choice.
- i. (2, 4) (Write the ordered pair.)
 - ii. There are infinitely many solutions.
 - iii. There is no solution.

$$\begin{array}{r} x + 3y = 14 \\ -3y \quad -3y \\ \hline x = -3y + 14 \end{array}$$

$$\begin{array}{r} 6(-3y + 14) - 5y = -8 \\ -18y + 84 - 5y = -8 \\ -23y + 84 = -8 \\ \quad -84 \quad -84 \\ \hline -23y = -92 \\ \quad -23 \quad -23 \\ \hline y = 4 \end{array}$$

$$\begin{array}{r} x + 3(4) = 14 \\ x + 12 = 14 \\ \quad -12 \quad -12 \\ \hline x = 2 \end{array}$$

Soln (2, 4)

2. Evaluate the following expressions for $a = 2, b = -5, c = -4,$ and $d = 10$. Show all work for credit. Unless otherwise specified, write your answers as integers or simplified fractions.

<p>a) $\frac{a}{d} \div \frac{b}{c}$</p> $\frac{2}{10} \div \frac{(-5)}{(-4)}$ $= \frac{2}{10} \cdot \frac{4}{5} = \boxed{\frac{4}{25}}$	<p>b) $b^2 - 4ac$</p> $(-5)^2 - 4(2)(-4)$ $25 + 32 = \boxed{57}$
<p>c) $\frac{-b-c^2}{2a}$</p> $\frac{-(-5) - (-4)^2}{2(2)} = \frac{5 - 16}{4}$ $= \boxed{\frac{-11}{4}}$	<p>d) $2c^2 - 5c + 3$</p> $2(-4)^2 - 5(-4) + 3$ $2(16) + 20 + 3 = \boxed{55}$

3. Factor. If the polynomial is prime, say so. Show all work for full credit. Circle your final answers.

a) $x^2 - 11x + 18$

$$(x-9)(x-2)$$

b) $2x^2 + 20x + 42$

$$2(x^2 + 10x + 21)$$

$$2(x+7)(x+3)$$

c) $25x^2 - 16$

$$(5x-4)(5x+4)$$

d) $x^2 - 4xy - 21y^2$

$$(x-7y)(x+3y)$$

e) $5x^5 + 45x^4 + 70x^3$

$$5x^3(x^2 + 9x + 14)$$

$$5x^3(x+7)(x+2)$$

f) $3xy^2 - 48x$

$$3x(y^2 - 16)$$

$$3x(y-4)(y+4)$$

g) $-x^2 - 4x - 3$

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

$$-(x+3)(x+1)$$

h) $3x^3 + x^2 + 27x + 9$

$$\begin{array}{r|l} 3x & 1 \\ \hline x^2 & 3x^3 \quad | \quad x^2 \\ 9 & 27x \quad | \quad 9 \end{array}$$

$$(x^2 + 9)(3x + 1)$$

5. Perform the indicated operations. Write your answers using integers or simplified fractions. Show all work and simplify your answers. You may leave your answers in factored form, as appropriate.

a) $(4p + 8q) + (4p - 9q)$

$$\boxed{8p - q}$$

NOT an equation - must find equiv fractions w/ common den $x(x-2)$

c) $\frac{5}{x} + \frac{3}{x-2} - \frac{7}{x}$

$$\frac{5(x-2)}{x(x-2)} + \frac{3x}{x(x-2)} - \frac{7(x-2)}{x(x-2)}$$

$$\frac{5x - 10 + 3x - 7x + 14}{x(x-2)} = \boxed{\frac{x+4}{x(x-2)}}$$

b) $(3t - 5w)^2$

$$(3t - 5w)(3t - 5w)$$

$$9t^2 - 15tw - 15tw + 25w^2$$

$$\boxed{9t^2 - 30tw + 25w^2}$$

d) $-5xy(3x^2 - 7xy + 9y^2)$

$$\boxed{-15x^3y + 35x^2y^2 - 45xy^3}$$

e) $2(x+3)^2 - 4$ First!

$$2(x^2 + 6x + 9) - 4$$

$$2x^2 + 12x + 18 - 4$$

$$\boxed{2x^2 + 12x + 14}$$

f) $5p^3t(-6p^3t)$

$$\boxed{-30p^6t^2}$$

g) $(11x - 7) - (5x + 8)$

$$11x - 7 - 5x - 8$$

$$\boxed{6x - 15}$$

h) $(5x - 4y)(3x - 6y)$

	3x	-6y	
5x	15x ²	-30xy	15x ² - 30xy + 2xy + 24y ²
-4y	-12xy	24y ²	

$$\boxed{15x^2 - 42xy + 24y^2}$$

i) $\frac{-6x+36}{x^2+7x+12} \cdot \frac{x^2-16}{-3x+18}$ should be 18

$$2 \cdot \frac{-6(x-6)}{(x+3)(x+4)} \cdot \frac{(x-4)(x+4)}{-3(x-6)}$$

$$\boxed{\frac{2(x-4)}{x+3}}$$

j) $\frac{x^2-64}{x^2-9x+20} \div \frac{x^2-15x+56}{x^2-4x-5}$

$$\frac{x^2-64}{x^2-9x+20} \cdot \frac{x^2-4x-5}{x^2-15x+56}$$

$$\frac{(x-8)(x+8)}{(x-4)(x-5)} \cdot \frac{(x-5)(x+1)}{(x-7)(x-8)}$$

$$\downarrow = \boxed{\frac{(x+8)(x+1)}{(x-4)(x-7)}}$$

6. Find an equation of the line containing the given pair of points. Write your answer in slope-intercept form. Use integers or simplified fractions for any numbers in your answer.

$(-6, 7)$ and $(8, -1)$
 $x_1 y_1$ $x_2 y_2$

$$m = \frac{-1 - 7}{8 - (-6)} = \frac{-8}{14} = -\frac{4}{7}$$

$$y = -\frac{4}{7}x + b$$

$$7 \cdot y = \left(-\frac{4}{7}x + b\right)7$$

$$7y = -4x + 7b$$

$$7(7) = -4(-6) + 7b$$

$$\begin{array}{r} 49 = 24 + 7b \\ -24 \quad -24 \\ \hline \end{array}$$

$$\frac{25}{7} = \frac{7b}{7}$$

$$b = \frac{25}{7}$$

$$y = -\frac{4}{7}x + \frac{25}{7}$$

7. Simplify. Use integers or simplified fractions in your answers. Show all work & circle your answers.

<p>a) $\frac{48x^6y^4}{8x^5y^{-3}}$</p> $6xy^7$	<p>b) $\frac{\frac{3}{x^2-16}}{\frac{4}{x+4}} \cdot \frac{x+4}{4}$</p> $\frac{3}{(x+4)(x-4)} \cdot \frac{x+4}{4}$ $= \frac{3}{4(x-4)}$	<p>c) $(4x^{-2}y)^3$</p> $64x^{-6}y^3$ $= \frac{64y^3}{x^6}$ <p>simplified means all positive exponents</p>
<p>d) $-5c^4(c^2)^5$</p> $-5c^4c^{10}$ $= -5c^{14}$	<p>e) -7^2</p> $-7 \cdot 7 = -49$ <p>note: only the 7 is being multiplied repeatedly</p>	<p>f) $\frac{(2a^{-6}b)^{-3}}{(3cd^{-2})^2} = \frac{1}{(2a^6b)^3(3cd^{-2})^2}$</p> $\frac{1}{8a^{18}b^39c^2d^{-4}}$ $= \frac{a^{18}d^4}{72b^3c^2}$
<p>g) $(-7)^2 = (-7)(-7) = 49$</p> <p>note: (-7) is being multiplied repeatedly</p>	<p>h) $-8(x-5) + 3x$</p> $-8x + 40 + 3x$ $-5x + 40$	<p>i) $\frac{5-\frac{3}{x}}{4-\frac{1}{x}} \cdot \frac{x}{x}$ (x is the LCD)</p> $\frac{5x-3}{4x-1}$

8. A batter hits a baseball ball into the air. The height h (in feet) of the baseball after t seconds is given by $h = -16t^2 + 80t + 4$.

a) Predict when the baseball is at a height of 68 feet. Show all work and write your answer in a complete sentence in the context of the problem.

$$-16t^2 + 80t + 4 = 68$$

$$\quad \quad \quad -68 = -68$$

$$t = 4 \text{ or } t = 1$$

$$\frac{-16t^2 + 80t - 64 = 0}{-16 \quad \quad \quad -16}$$

$$t^2 - 5t + 4 = 0$$

$$(t - 4)(t - 1) = 0$$

The baseball is at a height of 68 ft at 1 second & 4 seconds after the batter hits it

b) How high is the baseball after 2 seconds? Show all work and write your answer in a complete sentence in the context of the problem.

$$h = -16(2)^2 + 80(2) + 4$$

$$= -16 \cdot 4 + 160 + 4$$

$$= -64 + 164 = 100$$

$$t = 2$$

Two seconds after the ball is hit, it is 100 ft high

9. The average fare paid for business air travel was \$259 in 2000 and has decreased by about \$8 per year since then. Let F be the average fare (in dollars) paid for business air travel in the year that is t years since 2000.

a) Find an equation of a linear model to describe the data.

$$F = -8t + 259$$

b) What is the slope? What does it mean in this situation? Write your answer in a complete sentence.

-8 Each year the average fare for business travel decreases by \$8.

c) Predict the average fare in 2010. Write your answer in a complete sentence

$$F = -8(10) + 259$$

$$= -80 + 259$$

$$F = 179$$

In 2010, the avg fare for business will be \$179.

10. The weight of an object on Planet A and the weight of the same object on the Planet B are proportional. An astronaut who weighs 180 pounds on Planet A weighs 22.5 pounds on the Planet B. What is the weight of a person on Planet A if they weigh 28.9 pounds on the Planet B? Round your answer to the nearest integer as needed.

$\frac{\text{Weight on A}}{\text{Weight on B}}$

$$\frac{180 \text{ (on A)}}{22.5 \text{ (on B)}} = \frac{x}{28.9}$$

$$180 \cdot 28.9 = x \cdot 22.5$$

$$\frac{5202}{22.5} = \frac{22.5x}{22.5}$$

$$x = 231.2 \rightarrow$$

231 rounded to nearest integer

The weight of a person on Planet A is 231 pounds if they weigh 28.9 pounds on planet B.

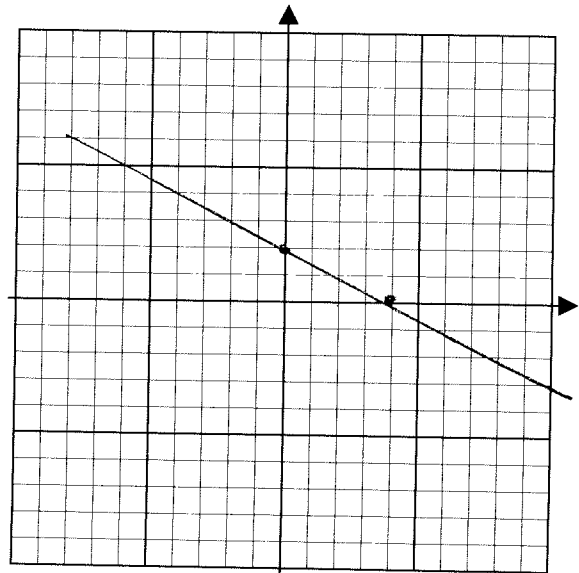
11. Find the x-intercept and y-intercept and then graph the equation.

$$4x + 8y = 16$$

- a) Slope-intercept form: $y = -\frac{1}{2}x + 2$
- b) x-intercept as an ordered pair: $(4, 0)$
- c) y-intercept as an ordered pair: $(0, 2)$
- d) Graph.

$$\begin{array}{r|l} 4x + 8y = 16 & 0 = -\frac{1}{2}x + 2 \\ -4x & -2 \\ \hline 8y = -4x + 16 & (-2) = (-\frac{1}{2}x)(-2) \\ \frac{8y}{8} & x = 4 \end{array}$$

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



12. In addition, there will be a problem that you have never seen before. Use what you have learned in this class in addition to your problem solving skills to solve it and explain.