

Answers to Study Guide for Final Exam

1. Solve the system by substitution. If the system is inconsistent or dependent, say so. Verify your solution by checking that it satisfies both equations in the system (if applicable).

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

(2,4) The soln is an ordered pair

2. Solve the system by elimination. If the system is inconsistent or dependent, say so. Verify your solution by checking that it satisfies both equations in the system (if applicable).

$$\begin{aligned} 6x - 9y &= -3 \\ -10x + 15y &= 5 \end{aligned}$$

↑ should be 5

dependent system infinite solus.

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) $2x^2 + 20x + 42$ $2(x+3)(x+7)$ |
| c) $25x^2 - 16$ $(5x-4)(5x+4)$ | d) $x^2 - 4xy - 21y^2$ $(x-7y)(x+3y)$ |
| e) $5x^5 + 45x^4 + 70x^3$ $5x^3(x+7)(x+2)$ | f) $3xy^2 - 48x$ $3x(y-4)(y+4)$ |
| g) $-x^2 - 4x - 3$ $-(x+3)(x+1)$ | h) $3x^3 + x^2 + 27x + 9$ $(3x+1)(x^2+9)$ |

4. Solve. Write your answers as integers or simplified fractions. Show all work & circle your answers.

| | |
|--|--|
| a) $\frac{5}{x} + \frac{3}{x-2} = \frac{7}{x}$ $x = -4$ | b) $\frac{w}{w+2} + \frac{7}{w-5} = \frac{14}{w^2-3w-10}$ $w = 0$ only! |
| c) $-x^2 - x + 3 = -9$ $x = -4$ or $x = 3$ | d) $(x+1)(x-2) = 4$ $x = 3$ or $x = -2$ |
| e) $-\frac{1}{2}x^2 + \frac{7}{2}x + 12 = 3$ mult both sides by -2 first $x = 9$ or $x = -2$ | f) $2x^3 - 3x^2 - 50x + 75 = 0$ $x = \frac{3}{2}, 5, \text{ or } -5$ |
| g) $5(x-2) - (3x+6) = 6(5x+3)$ | h) $-8 = \frac{4x}{7}$ $x = 14$ |

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) $(4p + 8q) + (4p - 9q)$ $8p - q$ | b) $(3t - 5w)^2$ $9t^2 - 30tw + 25w^2$ |
| c) $\frac{5}{x} + \frac{3}{x-2} - \frac{7}{x}$ $\frac{x+4}{x(x-2)}$ | d) $-5xy(3x^2 - 7xy + 9y^2)$ $-15x^3y + 35x^2y^2 - 45xy^3$ |
| e) $2(x+3)^2 - 4$ $2x^2 + 12x + 14$ | f) $5p^3t(-6p^3t)$ $-30p^6t^2$ |
| g) $(11x - 7) - (5x + 8)$ $6x - 15$ | h) $(5x - 4y)(3x - 6y)$ $15x^2 - 42xy + 24y^2$ |
| i) $\frac{-6x+36}{x^2+7x+12} \cdot \frac{x^2-16}{-3x+19}$ $\frac{2(x-4)}{x+3}$ ↑ should be 18 | j) $\frac{x^2-64}{x^2-9x+20} \div \frac{x^2-15x+56}{x^2-4x-5}$ $\frac{(x+8)(x-8)}{(x-4)(x-7)}$ |

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 $(8, -1)$

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

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

| | | |
|---|---|--|
| a) $\frac{48x^6y^4}{8x^5y^{-3}}$ $6xy^7$ | b) $\frac{\frac{x^2-16}{4}}{x+4}$ $\frac{3}{4(x-4)}$ | c) $(4x^{-2}y)^3$ $\frac{64y^3}{x^6}$ |
| d) $-5c^4(c^2)^5$ $-5c^{14}$ | e) -7^2 -49 | f) $\frac{(2a^{-6}b)^{-3}}{(3cd^{-2})^2}$ $\frac{a^2b^4}{72b^2c^2}$ |
| g) $(-7)^2$ 49 | h) $-8(x-5) + 3x$ $-5x+40$ | i) $\frac{5-\frac{3}{x}}{4-\frac{1}{x}}$ $\frac{5x-3}{4x-1}$ |

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.

$t=1$ or $t=4$ At 1 second and 4 seconds after the batter hits the ball into the air, it is at a height of 68 ft.

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.

Two seconds after the baseball is hit, it is 26 ft high.

9. The percentage of mothers who smoke cigarettes during pregnancy has declined approximately linearly from 13.9% in 1995 to 12.0% in 2000. Let t be the number of years since 1995 and p be the percentage of mothers who smoke cigarettes during pregnancy.

a) Find an equation of a linear model to describe the data. Round all numbers (including intermediate values) to two decimal places as necessary. Show all work.

$p = -.38t + 13.9$ ← use same variables as given in the problem

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

$-.38$ Each year the percentage of mothers who smoke cigarettes during pregnancy decreases by $-.38\%$.

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.

The weight of a person on Planet A if they weigh 28.9 pounds on planet B is 231.2 pounds

11. You invested \$7000 in two accounts paying 7% and 9% annual interest, respectively. If the total interest earned for the year was \$550, how much was invested at each rate? You do NOT need to solve the problem.

a) Define each variable.

Let a = amt of money (in \$) invested in 7% account

Let b = amt of money (in \$) invested in 9% account

b) Write a system of two equations.

$$a + b = 7000$$

$$.07a + .09b = 550$$

12. A 10,000 seat amphitheater will sell tickets at \$22 and \$30 for a Sarah McLachlan concert. How many tickets should be sold at each price for a sellout performance to generate a total revenue of \$232,000? You do NOT need to solve the problem.

a) Define each variable.

Let a = # of \$22 tickets to sell

Let b = # of \$30 tickets to sell

b) Write a system of two equations.

$$a + b = 10,000$$

$$22a + 30b = 232,000$$

note when you define variables, you describe what they mean in words.
Do not assign numerical values to variables in their definition