Midterm Review

Intermediate Algebra / MAT135 S2014 – test (Mr. Porter)

Student Name/ID:

1. Solve for u .

$$r = \frac{s-t}{u-8}$$

2. Solve for c .

$$d = \frac{6}{b} + \frac{5}{c}$$

3. At the city museum, child admission is $\$5.30$ and adult admission is $\$8.80$. On Wednesday, 154 tickets were sold for a total sales of $\$1050.70$. How many adult tickets were sold that day?

4. An alloy is a mixture of metals. Suppose that a certain alloy is made by mixing 50 grams of an alloy containing 12% copper with 78 grams of an alloy containing 92% copper.

Answer the questions below. Do not do any rounding.

(a) How many grams of copper are in the resulting mixture?   _____ grams
(b) What percentage of the resulting mixture is copper?   _____ %

5. Rachel invested her savings in two investment funds. The amount she invested in Fund A was 4 times as much as the amount she invested in Fund B. Fund A returned a 6% profit and Fund B returned a 5% profit. How much did she invest in Fund B, if the total profit from the two funds together was $\$3480$?

6. Write a compound inequality for the graph shown below.
Use x for your variable.
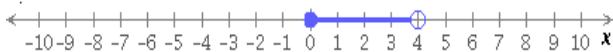
7. The sets F and H are defined as follows.
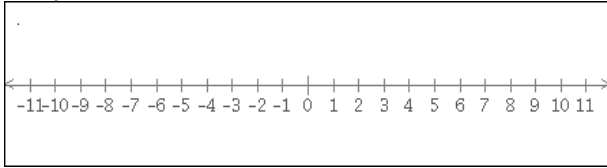
$$F = \{x \mid x > 1\}$$

$$H = \{x \mid x \le 6\}$$

Write $F \cup H$ and $F \cap H$ using interval notation.
If the set is empty, write $\varnothing$.

8. Solve the compound inequality.

$$-12 \le 4x+4 < 16$$

Graph the solution on the number line.

9. Solve the compound inequality.

$$2w-3 \le 5 \quad \text{or} \quad 4w-6 < -10$$

Write the solution in interval notation.
If there is no solution, enter ∅ .

10. Solve the compound inequality.

$$3w+5 \le -1 \quad \text{or} \quad 4w+4 < 20$$

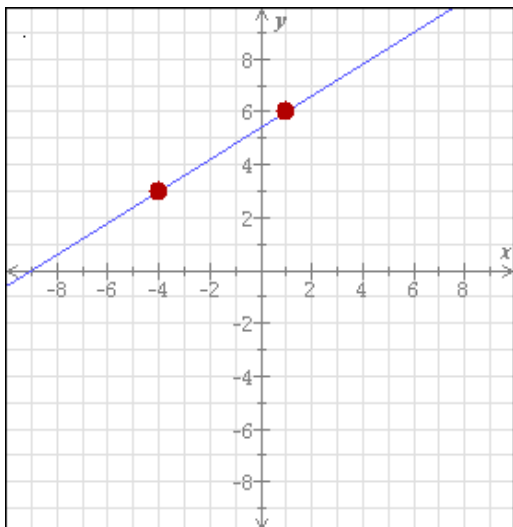Write the solution in interval notation.
If there is no solution, enter ∅ .

11. Solve.

$$4\left|x-9\right|-5 \le 11$$

12. Solve.

$$2\left|w+6\right|-7 \ge 9$$

13. Find an equation for the line below.

14. Consider the line $-9x - 6y = -4$.

What is the slope of a line perpendicular to this line?

What is the slope of a line parallel to this line?

15.
Consider the line $y = -\dfrac{5}{2}x - 6$.

(a) Find the equation of the line that is perpendicular to this line and passes through the point $(-8, 6)$.

(b) Find the equation of the line that is parallel to this line and passes through the point $(-8, 6)$.

16. Lamar received a $8.50 gift card for a photo center. He used it to buy prints that cost 7 cents each. The remaining balance, C (in dollars), on the card after buying x prints is given by the following function.

$$C(x) = 8.50 - 0.07x$$

What is the remaining balance on the card if Lamar bought 30 prints?

17. The entire graph of the function h is shown in the figure below.
Write the domain and range of h using interval notation.
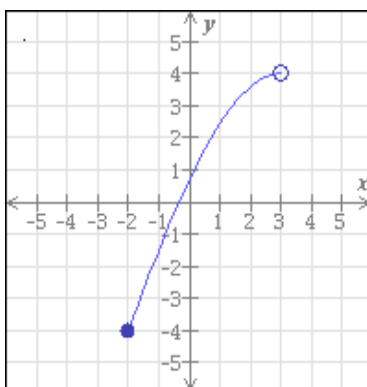
18. Find the domain of the function.

$$g(x) = \sqrt{x-4}$$

Write your answer using interval notation.

19. For each ordered pair, determine whether it is a solution to the system of equations.
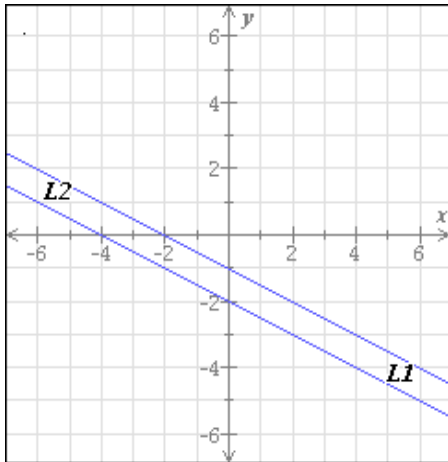
$$\begin{cases} 5x - 3y = 7 \\ y = -2x - 6 \end{cases}$$

(x, y)	Is it a solution?	
	Yes	No
$(-8, 10)$	○	○
$(2, 1)$	○	○
$(9, 0)$	○	○
$(-1, -4)$	○	○

20.

For each system of linear equations shown below, classify the system as "consistent dependent," "consistent independent," or "inconsistent." Then, answer the question about its solutions.

L1: $y = \dfrac{-1}{2}x - 1$

L2: $y = \dfrac{-1}{2}x - 2$

This system of equations is:

- consistent dependent - consistent independent - inconsistent

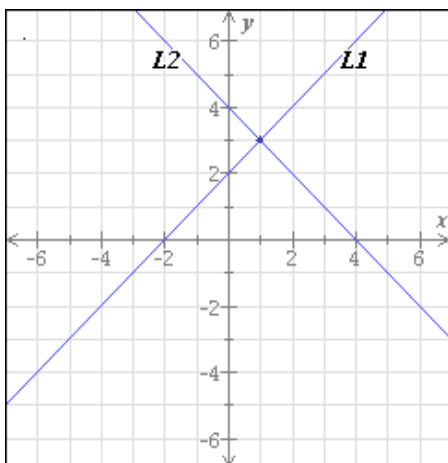This means the system has:

- a unique solution:
Solution: (,)
        - no solution   - infinitely many solutions

L1: $y = x + 2$

L2: $y = -x + 4$

This system of equations is:

- consistent dependent - consistent independent - inconsistent

This means the system has:

- a unique solution:
Solution: (,)   - no solution   - infinitely many solutions

L1: $y = -3x - 3$

L2: $3x + y = -3$

This system of equations is:

- consistent dependent - consistent independent - inconsistent
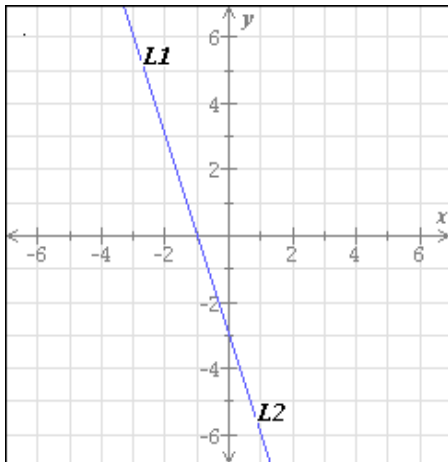
This means the system has:

- a unique solution:
Solution: (,)   - no solution   - infinitely many solutions

21. Use substitution to solve the system.

$$y = 3x - 4$$
$$4x + 3y = 27$$

$x = \ \square$

$y = \ \square$

22. Solve the following system of equations.

$$6x + 9y = -3$$
$$6x + 5y = 9$$

23. Solve the following system of equations.

$$7x - 2y = -9$$
$$4x - 5y = -9$$

24. A party rental company has chairs and tables for rent. The total cost to rent 5 chairs and 2 tables is $\$22$. The total cost to rent 3 chairs and 8 tables is $\$71$. What is the cost to rent each chair and each table?

25. The Nguyen family and the Green family each used their sprinklers last summer. The water output rate for the Nguyen family's sprinkler was $40\,\mathrm{L}$ per hour. The water output rate for the Green family's sprinkler was $25\,\mathrm{L}$ per hour. The families used their sprinklers for a combined total of 55 hours, resulting in a total water output of $1825\,\mathrm{L}$. How long was each sprinkler used?

Nguyen family's sprinkler:
Green family's sprinkler:

26. A scientist has two solutions, which she has labeled Solution A and Solution B. Each contains salt. She knows that Solution A is $70\,\%$ salt and Solution B is $95\,\%$ salt. She wants to obtain 110 ounces of a mixture that is $90\,\%$ salt. How many ounces of each solution should she use?

Solution A:
Solution B:

27. Hong bought a desktop computer and a laptop computer. Before finance charges, the laptop cost $400 less than the desktop. He paid for the computers using two different financing plans. For the desktop the interest rate was 7.5% per year, and for the laptop it was 8% per year. The total finance charges for one year were $371 . How much did each computer cost before finance charges?

28. Factor the following expression.

$$26 u^9 x^8 + 6 u^3 w^5 x^8$$

29. Factor by grouping.

$$2 w^3 + 5 w^2 + 14 w + 35$$

30. Factor by grouping.

$$u x - 7 x - 3 u + 21$$

31. Factor.

$$x^2 + x y - 20 y^2$$

32. Factor completely.

$$4y^2 - 28y + 48$$

33. Factor.

$$3y^2 - 4y - 7$$

34. Factor.

$$15x^2 - 34x - 16$$

35. Factor by grouping (sometimes called the *ac*-method).

$$20x^2 + 3x - 2$$

First, choose a form with appropriate signs.
Then, fill in the blanks with numbers to be used for grouping.
Finally, show the factorization.

Form:

○ $20x^2 + \underline{\quad}x + \underline{\quad}x - 2$

○ $20x^2 + \underline{\quad}x - \underline{\quad}x - 2$

○ $20x^2 - \underline{\quad}x + \underline{\quad}x - 2$

○ $20x^2 - \underline{\quad}x - \underline{\quad}x - 2$

Factorization:

_____

36. Factor:

$$5x^2 - 3xy - 14y^2$$

37. Factor.

$$w^2 + 14w + 49$$

38. Factor.

$$49u^2 - 28u + 4$$

39. Factor.

$$4 - 25w^2$$

40. Factor completely.

$$27w^3 - 48w$$

41. Factor completely.
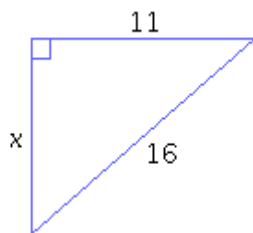
$$9x^5 + 24x^4 + 12x^3$$

**42.** Solve the equation

$$2x^2 - 10x + 4 = (x - 3)^2$$

for x .

43. The length of a rectangle is 5 yd less than twice the width, and the area of the rectangle is 33 yd^2 . Find the dimensions of the rectangle.

44. For the following right triangle, find the side length x. Round your answer to the nearest hundredth.

45. A 20-ft ladder leans against the side of a house. The bottom of the ladder is 10 ft from the side of the house. How high is the top of the ladder from the ground? Round your answer to the nearest tenth.
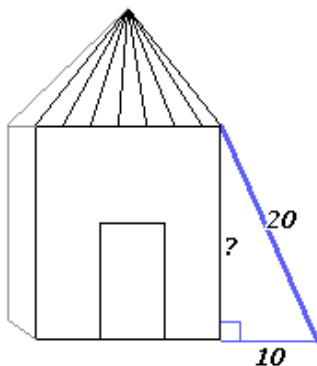
46. Simplify.

$$\frac{6 u^4 v^2}{18 u v^2}$$

47. Find all excluded values for the expression.
That is, find all values of w for which the expression is undefined.

$$\frac{3w}{2w - 10}$$

If there is more than one value, separate them with commas.

48. Find all excluded values for the expression.
That is, find all values of x for which the expression is undefined.

$$\frac{x^2 + 11x + 18}{x^2 - 9}$$

If there is more than one value, separate them with commas.

49. Simplify.

$$\frac{10u^2 - 25u}{5u^2 - 20u}$$

50. Simplify.

$$\frac{x - 8}{x^2 - 64}$$

51. Simplify.

$$\frac{4u^2 - 100}{u^2 - 8u + 15}$$

52. Simplify.

$$\frac{u^2 + 3u - 28}{32 - 2u^2}$$

53. Multiply.

$$\frac{4x - 20}{45x - 40} \cdot \frac{9x - 8}{2x - 10}$$

Simplify your answer as much as possible.

54. Multiply.

$$\frac{x - 1}{x^2 - x - 6} \cdot \frac{4x + 8}{x - 2}$$

Simplify your answer as much as possible.

55. Multiply.

$$\frac{21x^2 + x - 2}{3x - 3} \cdot \frac{x - 1}{49x^2 - 4}$$

Simplify your answer as much as possible.

56. Divide.

$$\frac{2y}{3a} \div \frac{10y^5}{9ay}$$

Simplify your answer as much as possible.

57. Divide.

$$\frac{21x^2 + x - 2}{3x - 3} \div \frac{49x^2 - 4}{x - 1}$$

Simplify your answer as much as possible.

58. Divide.

$$\frac{3x - 6y}{x^2 - 25y^2} \div \frac{x - 2y}{x^2 + xy - 20y^2}$$

Simplify your answer as much as possible.

59. Fill in the blank to make equivalent rational expressions.

$$\frac{3}{4v^5} = \frac{}{4v^7}$$

60. Factor.

$$125 - 8v^3$$

61.
Find the least common denominator of $\dfrac{2}{x-6}$ and $\dfrac{7}{x+6}$.

62.
Find the least common denominator of $\dfrac{7}{2x-8}$ and $\dfrac{5x}{3x-12}$.

63.
Find the least common denominator of $\dfrac{-7}{x^2-6x-27}$ and $\dfrac{3}{x^2-49}$.

64 Add.

$$\dfrac{9}{c+1}+\dfrac{5}{c+1}$$

Simplify your answer as much as possible.

65. Subtract.

$$-\dfrac{5x-6y}{4x}-\dfrac{3x+11y}{4x}$$

Simplify your answer as much as possible.

66 Add.

$$\frac{c^2 - 9c}{c^2 - c - 12} + \frac{3c + 8}{c^2 - c - 12}$$

Simplify your answer as much as possible.

67 Add.

$$\frac{5}{2} + \frac{7}{3c}$$

Simplify your answer as much as possible.

68 Add.

$$\frac{-2}{3x^2} + \frac{5}{9x}$$

Simplify your answer as much as possible.

69 Add.

$$\frac{-7}{6x^2 y} + \frac{3}{8xy^3}$$

Simplify your answer as much as possible.

70. Add.

$$\frac{x}{x+4} + \frac{3}{4x+16}$$

Simplify your answer as much as possible.

71. Subtract.

$$\frac{x+2}{2x+6} - \frac{x-3}{5x+15}$$

Simplify your answer as much as possible.

72. Add.

$$\frac{4}{3x^2+2x-1} + \frac{2}{3x^2-4x+1}$$

Simplify your answer as much as possible.