

Domain of Functions - Homework Assignment

Name: _____ Date: _____ Period: _____

Due Date: _____

Directions:

Complete all problems independently. Show all work and justify your answers using complete sentences. This homework reinforces what you learned in class about identifying and determining domains of functions from graphs and real-world contexts.

Part 1: Domain from Graphs (3 problems)

Instructions: For each graph, identify the domain. Write your answer using BOTH interval notation AND inequality notation. Explain how you determined the domain.

Problem 1: Linear Function

[Graph shows: Linear function $f(x) = -3x + 2$ extending infinitely in both directions with arrows]

a) Domain (Interval Notation): _____

b) Domain (Inequality Notation): _____

c) Explain how you determined the domain from the graph:

Problem 2: Quadratic Function with Restriction

[Graph shows: Parabola opening downward with vertex at $(2, 5)$, but only graphed from $x = -1$ (closed dot) to $x = 5$ (closed dot)]

a) Domain (Interval Notation): _____

b) Domain (Inequality Notation): _____

c) Why are there closed dots at $x = -1$ and $x = 5$? What does this tell you about the domain?

Problem 3: Piecewise Function

[Graph shows: Piecewise function with three pieces:

- Line from $x = -5$ (closed) to $x = -2$ (open)
- Horizontal line from $x = -2$ (closed) to $x = 2$ (closed)
- Curve from $x = 2$ (open) to $x = 6$ (closed)]

a) Domain (Interval Notation): _____

b) Domain (Inequality Notation): _____

c) Explain what happens at $x = -2$ and $x = 2$. How does this affect the domain?

Part 2: Domain from Real-World Context (3 problems)

Instructions: Read each scenario carefully. Determine the appropriate domain based on the context. Justify your answer by explaining why certain values make sense or don't make sense. Use complete sentences.

Problem 4: Car Rental

A car rental company charges \$50 per day. The function $C(d) = 50d$ represents the cost C for d days.

a) What does the variable d represent?

b) Can d be negative? Explain why or why not.

c) Can d be 0? Explain why or why not.

d) Can d be 3.5? Explain why or why not.

e) Is there a maximum value for d ? Explain your reasoning.

f) What is the practical domain for this function?

Domain: _____

g) Justification (use the sentence frame):

The domain is _____ because in this context, d represents _____ and it makes sense that _____

Problem 5: Ball Trajectory

A ball is thrown upward from ground level. The function $h(t) = -16t^2 + 32t + 6$ represents the height in feet after t seconds.

a) What does the variable t represent?

b) Can t be negative? Explain why or why not.

c) When does the ball hit the ground? (Hint: When is $h(t) = 0$? You may use a calculator to solve.)

$t \approx$ _____ seconds

Show your work or explain your method:

d) What is the practical domain for this function?

Domain: _____

e) What is the mathematical domain (if we ignore the real-world context)?

Mathematical domain: _____

f) Explain the difference between the mathematical domain and the practical domain for this problem.

Problem 6: Cell Phone Data Usage

A cell phone plan includes 10 GB of data per month. The function $D(d) = 10 - 0.5d$ represents the gigabytes of data remaining after d days of the month.

a) What does the variable d represent?

b) Can d be negative? Explain.

c) Can d be 15.5? Explain.

d) What is the maximum value for d in this context? (Hint: When does the data run out?)

$d =$ _____ days

Show your work:

e) What is the practical domain for this function?

Domain: _____

f) Is the domain discrete or continuous? Explain your reasoning.

Part 3: Create Your Own (2 problems)

Instructions: Demonstrate your understanding by creating your own scenarios and graphs with domain restrictions.

Problem 7: Create a Real-World Scenario with Restricted Domain

a) Create a real-world scenario where the domain would be restricted (not all real numbers). Your scenario should involve a function with a clear input and output.

My scenario:

b) Write the function that represents your scenario:

Function: _____

c) What is the appropriate domain for your function?

Domain: _____

d) Explain why the domain is restricted in your scenario. Use at least TWO vocabulary words from class (domain, input, output, continuous, discrete, restriction, quantitative relationship, contextual constraint).

Vocabulary words I used: _____ and _____

Problem 8: Sketch a Graph with Given Domain

a) Sketch a graph of ANY function where the domain is $-2 \leq x < 4$.

Requirements:

- Label your axes
- Use appropriate notation (open/closed circles)
- Make sure your graph clearly shows the domain restriction

[Grid provided for graphing]

b) Explain how your graph shows the domain restriction. What did you do at $x = -2$? What did you do at $x = 4$?

Part 4: Challenge Problems (Optional - Extra Credit)

Instructions: These problems are optional but will earn you extra credit if completed correctly.

Challenge Problem 1: Rational Function

Consider the function $f(x) = 1/(x - 3)$

a) For what value of x is this function undefined? Explain why.

b) What is the domain of this function?

Domain: _____

c) Sketch a rough graph showing the domain restriction.

[Grid provided]

Challenge Problem 2: Composition of Functions

If $f(x) = \sqrt{x}$ and $g(x) = x - 4$, what is the domain of $f(g(x))$?

Show your work and explain your reasoning:

Domain of $f(g(x))$: _____

Reflection Questions

1. What is the most important thing you learned about domain in this unit?

2. What is still confusing to you about domain?

3. How can understanding domain help you in real-world situations?

Self-Assessment Checklist

Before you turn in your homework, check that you have:

Completed all problems in Parts 1-3

Shown all work for calculations

- Written justifications using complete sentences
- Used correct mathematical notation (interval notation and/or inequality notation)
- Used vocabulary words from class in your explanations
- Checked your answers for reasonableness
- Completed reflection questions
- Put your name, date, and period at the top

Parent/Guardian Signature (Optional)

I have reviewed my student's homework.

Signature: _____ Date: _____

Comments:

HOMWORK EVALUATION RUBRIC

Domain of Functions Homework Assignment

Student Name: _____ Date: _____ Period: _____

Scoring Guide

Category	Advanced (4)	Proficient (3)	Developing (2)	Beginning (1)	Score
Part 1: Domain from Graphs (Problems 1-3)	All domains correctly identified in both notations; thorough,	Most domains correctly identified; explanations are clear and	Some domains correctly identified; explanations lack detail or	Few domains correctly identified; explanations are	___/4

	accurate explanations using proper vocabulary	mostly accurate	contain minor errors	incomplete or inaccurate	
Part 2: Real-World Context (Problems 4-6)	All contextual questions answered correctly with detailed, logical justifications; clear distinction between mathematical and practical domains	Most questions answered correctly; justifications are logical and mostly complete	Some questions answered correctly; justifications lack depth or contain errors	Few questions answered correctly; justifications are weak or missing	___/4
Part 3: Create Your Own (Problems 7-8)	Original scenario is creative and appropriate; function and domain are correct; graph accurately shows restrictions; explanations are thorough	Scenario is appropriate; function and domain are mostly correct; graph shows restrictions; explanations are adequate	Scenario is basic; function or domain contains errors; graph is incomplete; explanations lack detail	Scenario is unclear; function and domain are incorrect; graph is missing or inaccurate	___/4
Mathematical Notation	Consistently uses correct interval and inequality notation throughout; proper use of brackets, parentheses, and symbols	Mostly uses correct notation with minor errors; generally proper use of symbols	Inconsistent use of notation; several errors in brackets, parentheses, or symbols	Rarely uses correct notation; frequent errors or missing notation	___/4
Justifications & Reasoning	All answers include detailed, logical justifications using "because" statements; demonstrates deep	Most answers include adequate justifications; demonstrates solid understanding of domain concepts	Some answers include justifications, but they lack depth or logic; demonstrates partial	Few answers include justifications; demonstrate s limited understanding of domain concepts	___/4

	understandin g of domain concepts		understandin g		
Vocabulary Usage	Consistently uses academic vocabulary correctly (domain, input, continuous, discrete, restriction, etc.); enhances explanations	Frequently uses academic vocabulary correctly; generally enhances explanations	Occasionally uses academic vocabulary; some incorrect usage	Rarely uses academic vocabulary or uses it incorrectly	___/4
Work Shown	All work is shown clearly and organized; calculations are accurate and easy to follow	Most work is shown; calculations are mostly accurate and organized	Some work is shown; calculations may be disorganized or contain errors	Little to no work shown; calculations are missing or inaccurate	___/4
Completeness	All required problems completed (Parts 1-3); reflection questions answered thoughtfully	Most problems completed; reflection questions answered adequately	Some problems incomplete; reflection questions brief or missing	Many problems incomplete or missing; reflection questions not completed	___/4

Total Score: _____ / 32 points

Percentage: _____ %

Grading Scale:

- **A (90-100%):** 29-32 points
- **B (80-89%):** 26-28 points
- **C (70-79%):** 22-25 points
- **D (60-69%):** 19-21 points

- **F (Below 60%):** Below 19 points
-

Extra Credit (Optional)

Challenge Problem 1: _____ / 2 points

Challenge Problem 2: _____ / 2 points

Total Extra Credit: _____ / 4 points

Specific Feedback by Problem

Part 1: Domain from Graphs

Problem 1 (Linear Function): Correct domain Correct notation Clear explanation

Comments:

Problem 2 (Quadratic with Restriction): Correct domain Correct notation Clear explanation

Comments:

Problem 3 (Piecewise Function): Correct domain Correct notation Clear explanation

Comments:

Part 2: Real-World Context

Problem 4 (Car Rental): Correct domain Logical reasoning Complete justification

Comments:

Problem 5 (Ball Trajectory): Correct domain Accurate calculations
Distinguishes mathematical vs. practical domain

Comments:

Problem 6 (Cell Phone Data): Correct domain Identifies discrete vs. continuous
 Complete justification

Comments:

Part 3: Create Your Own

Problem 7 (Create Scenario): Appropriate scenario Correct function Correct
domain Uses vocabulary

Comments:

Problem 8 (Sketch Graph): Accurate graph Shows domain restrictions Proper
notation (circles) Clear explanation

Comments:

Strengths:

What the student did well:

Areas for Growth:

What the student should focus on improving:

Next Steps:

- Student demonstrates mastery - ready to move forward to range
 - Student shows proficiency - continue to next topic with occasional review
 - Student needs additional practice - provide extra problems or small group support
 - Student needs reteaching - schedule intervention or one-on-one conference
-

Teacher Notes:

Student Self-Reflection (to be completed after receiving graded homework):

What did you do well on this assignment?

What will you do differently next time?

What questions do you still have?

ANSWER KEY - Domain of Functions Homework

Part 1: Domain from Graphs

Problem 1: Linear Function

a) Domain (Interval Notation): $(-\infty, \infty)$ **b) Domain (Inequality Notation):** All real numbers OR $x \in \mathbb{R}$ OR $-\infty < x < \infty$ **c) Explanation:** The graph extends infinitely in both directions (shown by arrows), so all x-values are included in the domain.

Problem 2: Quadratic Function with Restriction

a) Domain (Interval Notation): $[-1, 5]$ **b) Domain (Inequality Notation):** $-1 \leq x \leq 5$ **c) Explanation:** Closed dots mean those values ARE included in the domain. The function only exists from $x = -1$ to $x = 5$, and both endpoints are included.

Problem 3: Piecewise Function

a) Domain (Interval Notation): $[-5, 6]$ **b) Domain (Inequality Notation):** $-5 \leq x \leq 6$ **c) Explanation:** At $x = -2$, there's an open circle on one piece and a closed dot on another, so $x = -2$ IS included (closed dot takes precedence). At $x = 2$, there's a closed dot on one piece and an open circle on the next, so $x = 2$ IS included. The overall domain includes all x-values from -5 to 6.

Part 2: Domain from Real-World Context

Problem 4: Car Rental

a) d represents the number of days the car is rented **b)** No, d cannot be negative because you cannot rent a car for a negative number of days **c)** Technically no, because if $d = 0$, you haven't rented the car at all (though some students may argue yes) **d)** Yes, d can be 3.5 because you can rent a car for 3.5 days (3 days and 12 hours) **e)** The problem doesn't specify a maximum, but practically there might be a limit (e.g., 30 days) **f)** Domain: $d > 0$ (or $d \geq 1$ if we say minimum is 1 day) **g)** Sample answer: The domain is $d > 0$ because in this context, d represents days rented, and it makes sense that you must rent for at least some positive amount of time.

Problem 5: Ball Trajectory

a) t represents time in seconds after the ball is thrown **b)** No, t cannot be negative because time cannot be negative in this context (we're measuring time AFTER the ball is thrown) **c)** Solve $-16t^2 + 32t + 6 = 0$ using quadratic formula: $t \approx 2.18$ seconds (accept 2.2 or similar) **d)** Practical domain: $0 \leq t \leq 2.18$ (or $[0, 2.18]$) **e)** Mathematical domain: All real numbers **f)** Sample answer: The mathematical domain is all real numbers because we can plug any number into the equation. However, the practical domain is restricted to

$0 \leq t \leq 2.18$ because time cannot be negative and the ball hits the ground at approximately 2.18 seconds.

Problem 6: Cell Phone Data Usage

a) d represents the number of days into the month **b)** No, d cannot be negative because we're measuring days into the month (can't have negative days) **c)** Yes, d can be 15.5 because we can measure partial days (15 days and 12 hours) **d)** Maximum d : Solve $10 - 0.5d = 0 \rightarrow d = 20$ days **e)** Practical domain: $0 \leq d \leq 20$ or $[0, 20]$ **f)** The domain is continuous because time can be measured in fractions of days (you can use data at any moment, not just at whole day intervals)

Part 3: Create Your Own

Problem 7: Create a Real-World Scenario

Answers will vary. Look for:

- Clear scenario with restricted domain
- Appropriate function
- Correct domain identification
- Use of at least 2 vocabulary words
- Logical explanation

Example: "A movie theater sells tickets for \$12 each. The function $R(t) = 12t$ represents revenue for t tickets sold. The theater has 200 seats. Domain: $0 \leq t \leq 200$ where t is a whole number (discrete). The domain is restricted because you cannot sell negative tickets or more than 200 tickets (contextual constraint)."

Problem 8: Sketch a Graph

Answers will vary. Look for:

- Any function graphed correctly
 - Closed circle at $x = -2$ (because $-2 \leq x$)
 - Open circle at $x = 4$ (because $x < 4$)
 - Graph only exists between $x = -2$ and $x = 4$
 - Clear explanation of notation choices
-

Challenge Problems (Extra Credit)

Challenge Problem 1: Rational Function

a) The function is undefined when $x = 3$ because division by zero is undefined (the denominator becomes 0) **b)** Domain: All real numbers except $x = 3$, or $(-\infty, 3) \cup (3, \infty)$, or $x \neq 3$ **c)** Graph should show vertical asymptote at $x = 3$

Challenge Problem 2: Composition of Functions

Work: $f(g(x)) = f(x - 4) = \sqrt{x - 4}$ For square root to be defined, the expression inside must be ≥ 0 So: $x - 4 \geq 0 \rightarrow x \geq 4$ **Domain:** $x \geq 4$ or $[4, \infty)$

Grading Notes for Teachers:

Common Errors to Watch For:

1. Confusing domain with range (writing y-values instead of x-values)
2. Using wrong notation (parentheses vs. brackets)
3. Not considering real-world constraints in context problems
4. Forgetting to explain reasoning
5. Not using academic vocabulary

Partial Credit Guidelines:

- Award partial credit for correct reasoning even if notation is incorrect
- Award partial credit for identifying correct values even if explanation is weak
- Do not award credit for correct answers without any work or justification shown

Feedback Focus:

- Highlight specific strengths in student work
- Provide actionable feedback for improvement
- Connect feedback to learning objectives
- Encourage growth mindset language

30/30

A

ALGEBRA I — SECTION 5.7 HOMEWORK

The Scenario: Game Night Budget

Your best friend is hosting a game night for your friend group this Friday, and they put you in charge of snacks. You have \$24 to spend at the corner store.

- Bags of chips cost \$3.00 each.
- Bottles of soda cost \$1.50 each.
- You want to make sure there's enough to go around — you need to buy at least 10 items total.
- The store shelf only has room for at most 12 sodas, so you can't buy more than 12 bottles.

Let x = number of bags of chips and y = number of bottles of soda.

Part a. Write a system of inequalities for this situation. Use x for chips and y for sodas. Label and explain each inequality.

$$24 \geq 3x + 1.50y$$

x represents the # of bags of chips which cost 3 dollars each, y represents the amount of bottles of sodas which cost 1.50 dollars each, the total must be 24 dollars or less.

The number of bags of chips and bottles of soda must be 10 or more items or more

$$x + y \geq 10$$

$$y \leq 12$$

The number of sodas must be 12 or less

+5

Part b. Graph the system of inequalities below. Be sure to: (1) graph each boundary line, (2) indicate solid or dashed lines correctly, (3) shade each half-plane using a different color, and (4) label the solution region.

[Use the grid on the back of this sheet, or attach separate graph paper.]

+5

Part c. Indicate on your graph which combinations of chips and sodas are possible. Explain your reasoning in depth — what does the shaded region represent in this context?

+5

The shaded region represents the number of bags of chips and bottles of soda you can buy to meet all requirements

Part d. Does EVERY point within the feasible region represent a valid solution in this context? Why or why not? (Think carefully about what x and y represent.)

+5

No, not every point within the feasible region would represent a valid solution because you can't have a negative amount of chips or half of chips

Part e. Identify ONE combination of chips and sodas that IS possible (not an x - or y -intercept) and ONE combination that is NOT possible (not an x - or y -intercept). Write them as ordered pairs.

Possible combination: $(2, 8)$ Why: They are in the region which is shaded by all systems

+3

NOT possible combination: $(2, -2)$ Why: They are not in the region which is shaded by all systems

Part f. PROVE each of your answers from Part e algebraically. Substitute each ordered pair into EVERY inequality in your system and show all work.

+7

$$16 - 2x \geq y$$

$$y \leq 14$$

$$y \geq -x + 10$$

$$16 - 2(2) \geq 8$$

$$8 \leq 14$$

$$8 \geq -2 + 10$$

$$12 \geq 8$$

$$8 \geq 8$$

$$12 \geq 8 \checkmark$$

$$\checkmark$$

$$\checkmark$$

EXTENSION (Advanced — optional for extra credit):

Part g. Your friend decides to also limit the number of chip bags to at most 6 (the small bag rack is almost empty). Add this constraint as a third inequality. Sketch the new solution region on a new graph and explain in writing how this changes the possible combinations.

$$x \leq 6$$

I don't believe this would change the possible combinations since the new shaded region still fully covers the past shaded region.

HOMEWORK GRADING RUBRIC

Section 5.7 — Systems of Linear Inequalities (Total: 30 points)

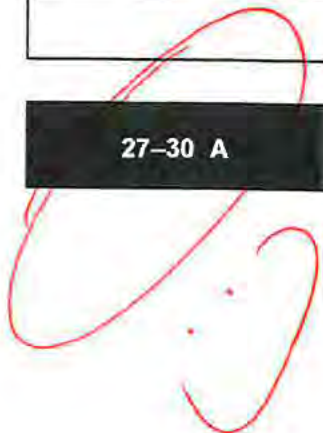
Part	Full Credit	Partial Credit	Minimal / No Credit	Points
Part a	5 pts: All 4 correct inequalities written with correct symbols; variables correctly defined; all 4 constraints present and labeled.	3 pts: 3 of 4 correct; or correct inequalities but missing labels/definitions.	0–1 pts: Fewer than 2, correct inequalities; variables undefined; symbols incorrect throughout.	<u>5</u> / 5 <i>great job writing & explaining!</i>
Part b	5 pts: All 4 boundary lines correctly graphed; solid/dashed correctly applied; each half-plane shaded in different color; solution region clearly labeled.	3 pts: Lines mostly correct; 1–2 errors in shading or solid/dashed distinction.	0–1 pts: Fewer than 2 lines correct; no shading; solution region not identified.	<u>5</u> / 5 <i>😊</i>
Part c	5 pts: Solution region correctly indicated on graph; explanation clearly describes meaning in context using mathematical vocabulary; addresses all combinations.	3 pts: Graph correct but explanation vague; or explanation good but graph partially incorrect.	0–1 pts: No written explanation; solution region not identified.	<u>5</u> / 5 <i>great use of vocab.</i>
Part d	5 pts: Correctly identifies that only whole-number (discrete) values are valid; explains clearly why fractional bags/sodas don't make sense in context.	3 pts: Correct answer but explanation incomplete; or mentions discrete values without clearly connecting to context.	0–1 pts: States every point is valid with no reasoning; or no response.	<u>5</u> / 5
Part e	3 pts: Both ordered pairs correct; both explanations specific and connected to the solution region on the graph.	2 pts: One correct pair with good explanation; second pair incorrect or unexplained.	0–1 pts: Both pairs listed with no reasoning; or both incorrect.	<u>3</u> / 3 <i>more explanations</i>
Part f	7 pts: Both ordered pairs substituted into ALL inequalities; all arithmetic correct; clear conclusion stated for each ('This IS/IS NOT a solution because...').	4–5 pts: Mostly correct; minor arithmetic errors; or conclusion partially stated.	0–2 pts: Substitution incomplete or missing; no conclusion; incorrect inequalities used.	<u>7</u> / 7
TOTAL SCORE:				<u>30</u> / 30

27–30 A

22–26 B

16–21 C

Below 16 — Needs Revision



17/30 ©

ALGEBRA I — SECTION 5.7 HOMEWORK

Systems of Linear Inequalities (Real-World Applications)

The Scenario: Game Night Budget

Your best friend is hosting a game night for your friend group this Friday, and they put you in charge of snacks. You have \$24 to spend at the corner store.

- Bags of chips cost \$3.00 each.
- Bottles of soda cost \$1.50 each.
- You want to make sure there's enough to go around — you need to buy at least 10 items total.
- The store shelf only has room for at most 12 sodas, so you can't buy more than 12 bottles.

Let x = number of bags of chips and y = number of bottles of soda.

Part a. Write a system of inequalities for this situation. Use x for chips and y for sodas. Label and explain each inequality.

$3x + 1.5y \geq 24$ — ^{use} limit

x sodas
4 chips

$4(3) + 8(1.5) \geq 24$
 $12 + 12 = 24$

$4 = 12$ 4 sodas
 $1.5 = 12$ 8 chips

+3

$x + y \geq 10$ total item needed

$y \leq 12$

Part b. Graph the system of inequalities below. Be sure to: (1) graph each boundary line, (2) indicate solid or dashed lines correctly, (3) shade each half-plane using a different color, and (4) label the solution region.

[Use the grid on the back of this sheet, or attach separate graph paper.]

+3

Part c. Indicate on your graph which combinations of chips and sodas are possible. Explain your reasoning in depth — what does the shaded region represent in this context?

+0

Part d. Does EVERY point within the feasible region represent a valid solution in this context? Why or why not? (Think carefully about what x and y represent.)

+1
No some are not within the shaded part

Part e. Identify ONE combination of chips and sodas that IS possible (not an x - or y -intercept) and ONE combination that is NOT possible (not an x - or y -intercept). Write them as ordered pairs.

Possible combination: (4, 8) Why: It is within shaded region and meets the min

+3
NOT possible combination: (8, 8) Why: Its total is 36

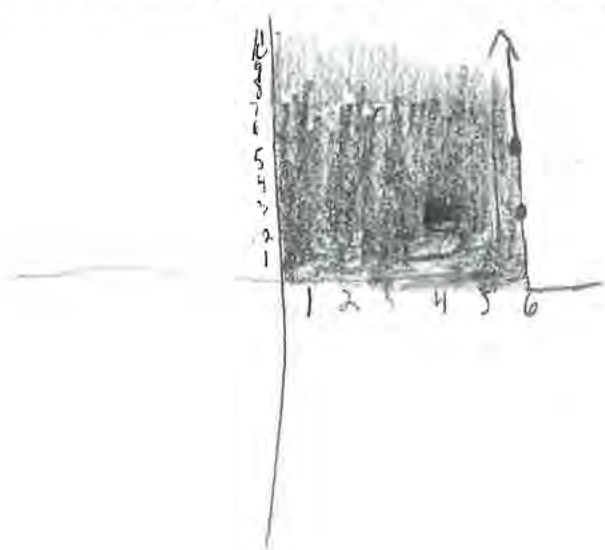
Part f. PROVE each of your answers from Part e algebraically. Substitute each ordered pair into EVERY inequality in your system and show all work.

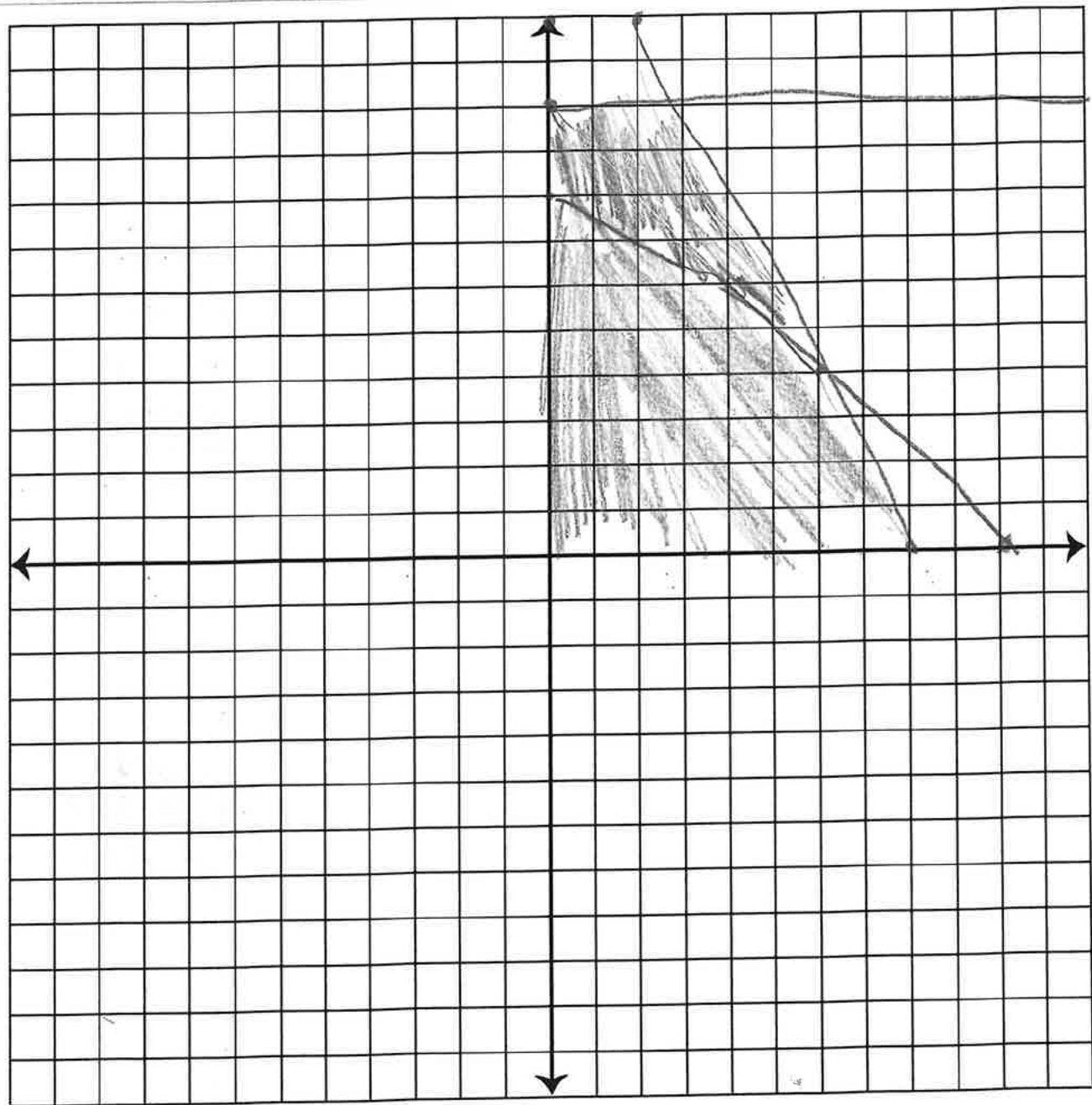
+7
 $3x + 1.5y \leq 24$
 $x + y \geq 10$
 $y \leq 12$
 418
 418 is true
 $3(4) + 1.5(8) \leq 24$
 $12 + 12 = 24$
 418 is false
 $3(8) + 1.5(8) = 36$

EXTENSION (Advanced — optional for extra credit):

Part g. Your friend decides to also limit the number of chip bags to at most 6 (the small bag rack is almost empty). Add this constraint as a third inequality. Sketch the new solution region on a new graph and explain in writing how this changes the possible combinations.

$3x + 1.5y \leq 24$
 $x + y \geq 10$
 $y \leq 12$
 $x \leq 6$





2,10
4,8
6,4

17

HOMEWORK GRADING RUBRIC

Section 5.7 — Systems of Linear Inequalities (Total: 30 points)

Part	Full Credit	Partial Credit	Minimal / No Credit	Points
Part a	5 pts: All 4 correct inequalities written with correct symbols; variables correctly defined; all 4 constraints present and labeled.	3 pts: 3 of 4 correct; or correct inequalities but missing labels/definitions.	0–1 pts: Fewer than 2 correct inequalities; variables undefined; symbols incorrect throughout.	<u>3</u> / 5 <i>missing 1 inequality</i>
Part b	5 pts: All 4 boundary lines correctly graphed; solid/dashed correctly applied; each half-plane shaded in different color; solution region clearly labeled.	3 pts: Lines mostly correct; 1–2 errors in shading or solid/dashed distinction.	0–1 pts: Fewer than 2 lines correct; no shading; solution region not identified.	<u>3</u> / 5 <i>are different colors to represent diff. inequalities</i>
Part c	5 pts: Solution region correctly indicated on graph; explanation clearly describes meaning in context using mathematical vocabulary; addresses all combinations.	3 pts: Graph correct but explanation vague; or explanation good but graph partially incorrect.	0–1 pts: No written explanation; solution region not identified.	<u>0</u> / 5
Part d	5 pts: Correctly identifies that only whole-number (discrete) values are valid; explains clearly why fractional bags/sodas don't make sense in context.	3 pts: Correct answer but explanation incomplete; or mentions discrete values without clearly connecting to context.	0–1 pts: States every point is valid with no reasoning; or no response.	<u>1</u> / 5 <i>can chip bags be negative? or a decimal?</i>
Part e	3 pts: Both ordered pairs correct; both explanations specific and connected to the solution region on the graph.	2 pts: One correct pair with good explanation; second pair incorrect or unexplained.	0–1 pts: Both pairs listed with no reasoning; or both incorrect.	<u>3</u> / 3
Part f	7 pts: Both ordered pairs substituted into ALL inequalities; all arithmetic correct; clear conclusion stated for each ('This IS/IS NOT a solution because...').	4–5 pts: Mostly correct; minor arithmetic errors; or conclusion partially stated.	0–2 pts: Substitution incomplete or missing; no conclusion; incorrect inequalities used.	<u>7</u> / 7
TOTAL SCORE:				<u>17</u> / 30

27–30 A	22–26 B	16–21 C	Below 16 — Needs Revision
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15/30 needs revision

ALGEBRA I — SECTION 5.7 HOMEWORK

The Scenario: Game Night Budget

Your best friend is hosting a game night for your friend group this Friday, and they put you in charge of snacks. You have \$24 to spend at the corner store.

- Bags of chips cost \$3.00 each.
- Bottles of soda cost \$1.50 each.
- You want to make sure there's enough to go around — you need to buy at least 10 items total.
- The store shelf only has room for at most 12 sodas, so you can't buy more than 12 bottles.

Let x = number of bags of chips and y = number of bottles of soda.

Part a. Write a system of inequalities for this situation. Use x for chips and y for sodas. Label and explain each inequality.

$$\begin{aligned} 3x + 1.5y &\leq 24 \\ x + y &\geq 10 \\ y &\leq 12 \end{aligned}$$

Part b. Graph the system of inequalities. Be sure to: (1) graph each boundary line, (2) indicate solid or dashed lines correctly, (3) shade each half-plane using a different color, and (4) label the solution region.

[Use the grid on the back of this sheet, or attach separate graph paper.]

Part c. Indicate on your graph which combinations of chips and sodas are possible. Explain your reasoning in depth — what does the shaded region represent in this context?

any part inside the shaded region is a possible combination of chips and soda

Part d. Does EVERY point within the feasible region represent a valid solution in this context? Why or why not? (Think carefully about what x and y represent.)

No,

+0

Part e. Identify ONE combination of chips and sodas that IS possible (not an x - or y -intercept) and ONE combination that is NOT possible (not an x - or y -intercept). Write them as ordered pairs.

Possible combination: (6, 4) Why: _____

NOT possible combination: (10, 10) Why: _____

+0

Part f. PROVE each of your answers from Part e algebraically. Substitute each ordered pair into EVERY inequality in your system and show all work.

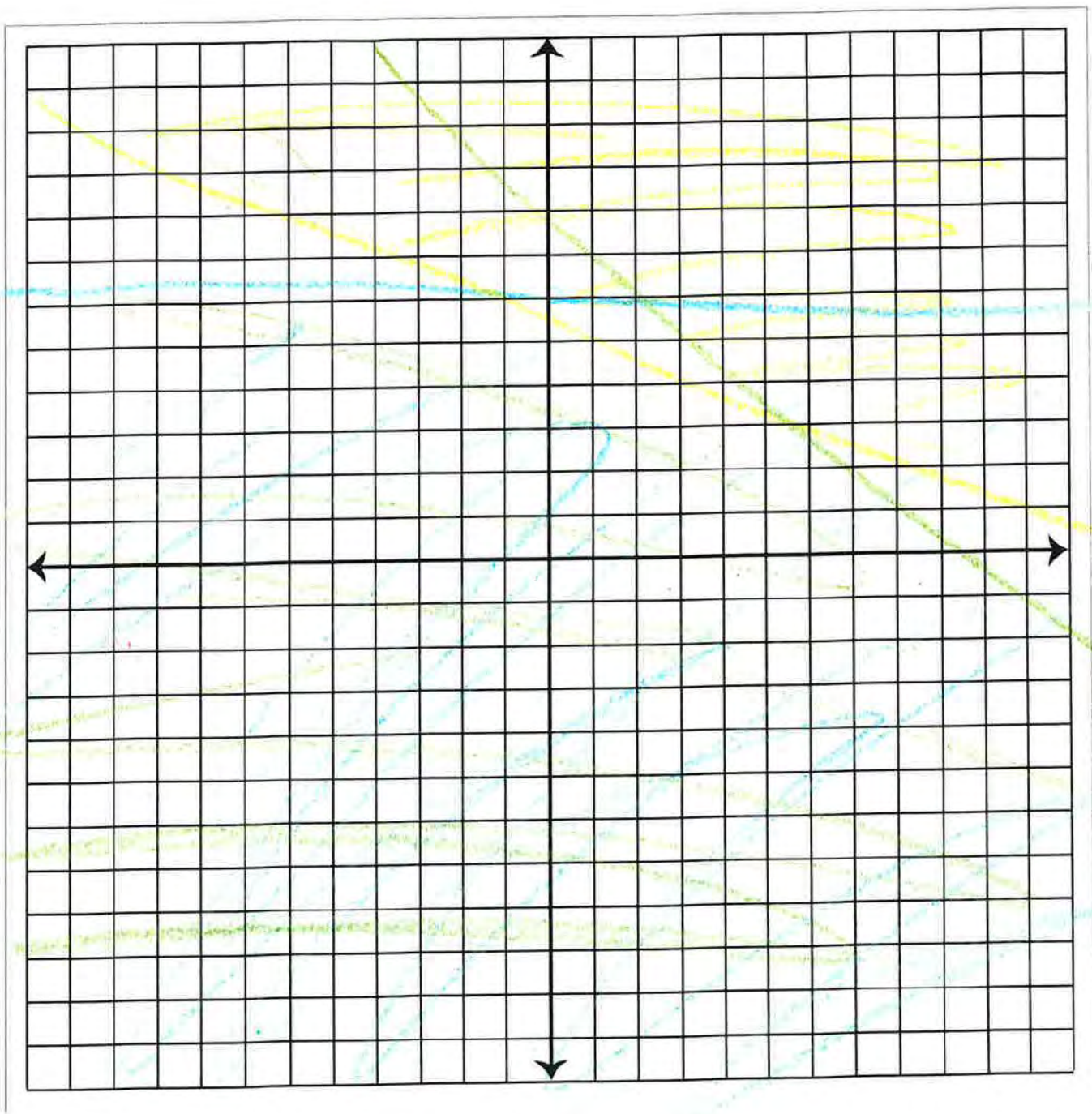
+0

$$3(6) + 1.5(4) = 24$$
$$3(10) + 1.5(10) = 45$$

EXTENSION (Advanced — optional for extra credit):

Part g. Your friend decides to also limit the number of chip bags to at most 6 (the small bag rack is almost empty). Add this constraint as a third inequality. Sketch the new solution region on a new graph and explain in writing how this changes the possible combinations.

$$x \leq 6$$



HOMEWORK GRADING RUBRIC

Section 5.7 — Systems of Linear Inequalities (Total: 30 points)

Part	Full Credit	Partial Credit	Minimal / No Credit	Points
Part a	5 pts: All 4 correct inequalities written with correct symbols; variables correctly defined; all 4 constraints present and labeled.	3 pts: 3 of 4 correct; or correct inequalities but missing labels/definitions.	0–1 pts: Fewer than 2 correct inequalities; variables undefined; symbols incorrect throughout.	<u>5</u> / 5
Part b	5 pts: All 4 boundary lines correctly graphed; solid/dashed correctly applied; each half-plane shaded in different color; solution region clearly labeled.	3 pts: Lines mostly correct; 1–2 errors in shading or solid/dashed distinction.	0–1 pts: Fewer than 2 lines correct; no shading; solution region not identified.	<u>3</u> / 5 <i>please label your x-y axis</i>
Part c	5 pts: Solution region correctly indicated on graph; explanation clearly describes meaning in context using mathematical vocabulary; addresses all combinations.	3 pts: Graph correct but explanation vague; or explanation good but graph partially incorrect.	0–1 pts: No written explanation; solution region not identified.	<u>5</u> / 5 <i>good explanation</i>
Part d	5 pts: Correctly identifies that only whole-number (discrete) values are valid; explains clearly why fractional bags/sodas don't make sense in context.	3 pts: Correct answer but explanation incomplete; or mentions discrete values without clearly connecting to context.	0–1 pts: States every point is valid with no reasoning; or no response.	<u>0</u> / 5 <i>Why?</i>
Part e	3 pts: Both ordered pairs correct; both explanations specific and connected to the solution region on the graph.	2 pts: One correct pair with good explanation; second pair incorrect or unexplained.	0–1 pts: Both pairs listed with no reasoning; or both incorrect.	<u>0</u> / 3 <i>no reasoning?</i>
Part f	7 pts: Both ordered pairs substituted into ALL inequalities; all arithmetic correct; clear conclusion stated for each ('This IS/IS NOT a solution because...').	4–5 pts: Mostly correct; minor arithmetic errors; or conclusion partially stated.	0–2 pts: Substitution incomplete or missing; <u>no conclusion</u> ; incorrect inequalities used.	<u>0</u> / 7
TOTAL SCORE:				<u>13</u> / 30

27–30 A

22–26 B

16–21 C

Below 16 — Needs Revision