

MAT137L Study Guide

Unit 1

- Identify the variables and constants in a problem. Label your variables with “smart” variables and proper units
- Translate words and situations into an algebraic expression or equation. Use pictures to help you.
- Solve equations and systems of equations algebraically
- Be able to put your answers back into the context of the problem and check to see that they make sense
- Know what a function is and be able to determine if a relation is a function from both a table and a graph
- Be comfortable working with function notation
- Be able to identify the domain and range of a function

Unit 2

- Identify a linear relationship from a table, graph, or equation
- Write a linear equation from a table, a graph or a situation
- Be able to identify and interpret slope and y-intercept in the context of a situation
- Answer questions related to a linear situation using a graph or equation
- Identify the real-world domain and range in a situation

Unit 3

- Identify an exponential relationship from a table, graph, or equation
- Write an exponential equation from a table, a graph, or a situation
- Be able to identify and interpret initial value, growth or decay factor, and growth or decay rate in the context of a situation
- Answer questions related to an exponential situation using a graph or equation
- Identify the real-world domain and range in a situation

Unit 4

- Identify a quadratic relationship from a table, graph, or equation
- Identify the coefficients a,b, and c in a quadratic equation
- Know how to tell when a parabola opens up or down
- Know how to tell when the vertex is a minimum or maximum value
- Be able to find y-intercept, vertex, axis of symmetry, and x-intercepts algebraically
- Answer questions related to a quadratic situation using a graph or equation
- Identify the real-world domain and range in a situation

Final Exam Practice Problems:

1. The top three sales agents in one company are comparing their car sales from last year. Gina sold 160 less than twice the cars that Hannah sold, and John sold 25 fewer cars than Hannah. If the three of them sold 515 cars altogether, then how many did each sell?

a) Identify and label the variables and the constants in this problem, including units.

b) Write an equation or equations that will help you solve the problem algebraically.

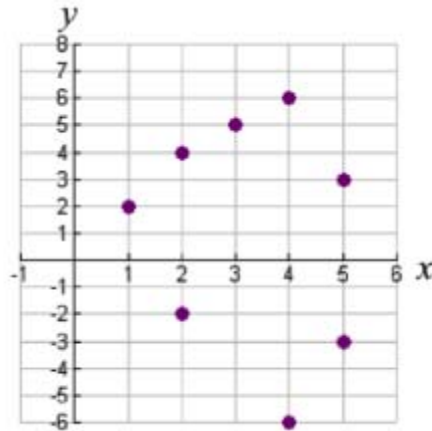
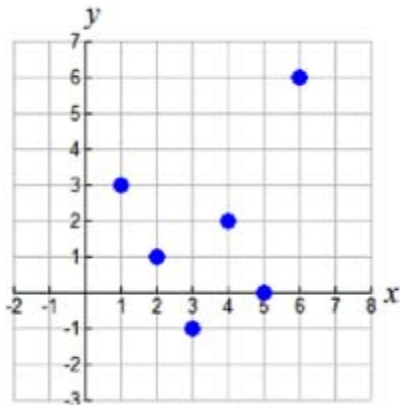
c) Solve the problem algebraically (using your variables and the equation(s)).

2. Is the relation shown in each table a function? Explain why or why not.

age	# visits to Disneyland
2	0
5	1
9	3
12	2
9	4
11	2

# folds	# layers thick
0	1
1	2
2	4
3	8
4	16
5	32

3. Explain why each graph does or does not represent a function.



4. For each linear situation below:

- Identify and label the variables and the constants including units.
- Identify the constant rate of change and the initial value.
- Write an equation for the linear function that relates the two variables.

I. Linda bought a seedling plant that is two feet tall and will grow about $\frac{1}{4}$ inch per week.

II. A car rental company charges \$25 to rent and 2 cents for every mile driven.

III. The pool started with 30,000 gallons of water in it and then drained 12 gallons every 3 minutes.

5. **Some college students who plan on becoming math teachers decide to set up a tutoring service for high school math students. One student was charged \$25 for 3 hours of tutoring. Another student was charged \$55 for 7 hours of tutoring. The relationship between the cost and time is linear.**

a) Identify the independent and dependent variables including their units.

b) Create a table of values for the situation. Write an equation to model the situation

c) What is the meaning of the slope in this situation?

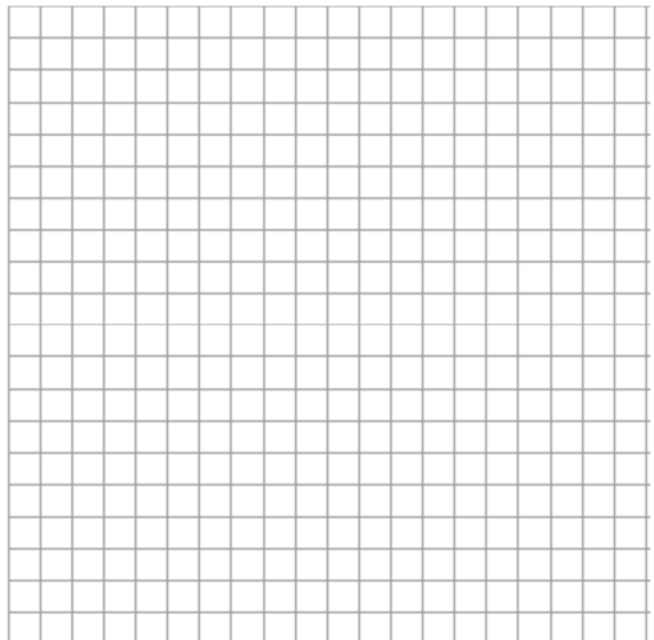
d) What is the cost-intercept? What does the cost-intercept represent?

e) Show how to use your function equation to find the cost of a 5-hour tutoring session.

6. The cost of a rental house for a vacation is the cleaning fee plus the cost for each night you stay. The cost in dollars when you stay x nights is given by the function:

$$C(x) = 150 + 200x$$

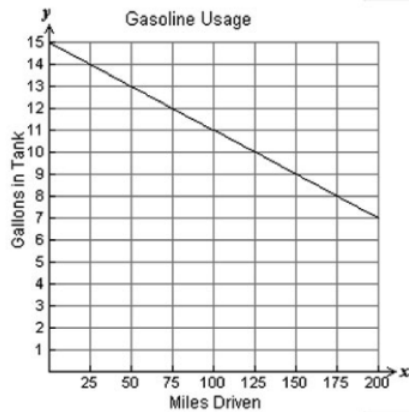
- a) What is the cleaning fee?
- b) Explain the meaning of the coefficient 200 in the equation using units.
- c) If the total cost is \$1750, then how many nights did you stay?
- d) If you can go on vacation for at most 14 days, then what is the domain and range of this function?
- e) Draw a graph of the function with the domain and range from (d) by plotting at least 3 points. Label axes with variables and units and choose appropriate scales.



7. Answer the following questions for each relation below:

- Identify and label the dependent and independent variables in each relation below including units.
- Find and interpret the meaning of the slope including units.
- Write an equation that expresses the relationship between the variables.
- Explain the meaning of the y intercept in each graph.

a) The graph shows the number of gallons of gas left in a tank after driving a certain number of miles.



b) The graph shows the weekly wages an employee can earn at Company X.



8. Julia just made a purchase on her credit card and can't pay it off. The function that models the amount she owes in dollars, t years after her purchase is:

$$A(t) = 750(1.18)^t$$

- a) How much did Julia charge on her credit card?
- b) How much does Julia owe after one and a half years?
- c) What is the interest rate on this credit card?
- d) Show how to use logarithms to find out how long it will take for her to owe twice as much as she originally charged. Round to the nearest year.

10. **Given the function:** $f(x) = x^2 + 12x + 48$

Find the following important points and put them in a table. Show *and label* your work clearly.

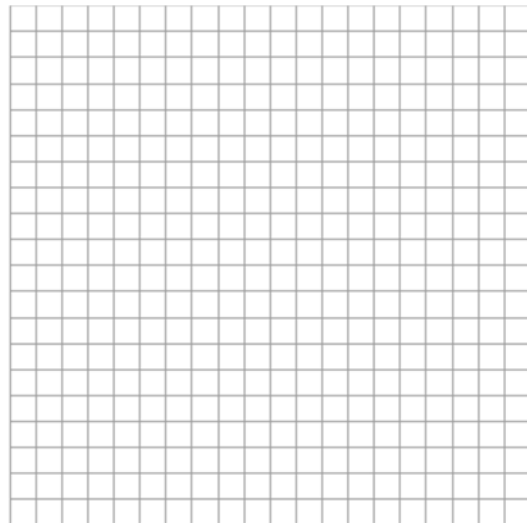
a) Find $f(10)$. Write your answer as an ordered pair.

b) Find the vertex.

c) Find the y-intercept.

d) Find the x intercept(s).

e) Draw a sketch of the graph.



11. A basketball is shot upward at 36 ft/s from a height of 6 feet. The height of the ball, h , at time t is given by the equation:

$$h(t) = -16t^2 + 36t + 6$$

Answer the following questions. Round all final answers to 2 decimal places (the nearest hundredth).

a) How high is the ball after 2 seconds?

b) What is the maximum height the ball reaches?

c) How long will it take to reach that maximum height?

d) If the rim of the basketball hoop is 10 feet off the ground, how long will it take to hit the rim?

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e) If the ball misses the rim altogether, how long will it take the basketball to hit the ground?

f) What was the initial height of the basketball at the moment the player released it?

g) Give the contextual (real-world) domain and range for this function.

12. Determine if the following tables represent a linear, exponential, quadratic function and explain how you know. If it is none of them then please explain.

x	y
1	-4
2	-2
3	3
4	11
5	22

d days	N(d) cells
1	45,000
3	30,000
5	20,000
7	13,333

t months	P(t) dollars
3	28,000
7	21,000
11	14,000
15	7,000

13. For each function, determine whether it is linear, exponential, quadratic or neither. Then identify the initial value.

a) $y = 2x^2 - 5x + 7$

b) $y = 1000(\frac{1}{5})^x$

c) $y = -4x + 22$

14. Identify if each is the graph of a linear, exponential or quadratic function. Then write an equation that could represent each graph.

