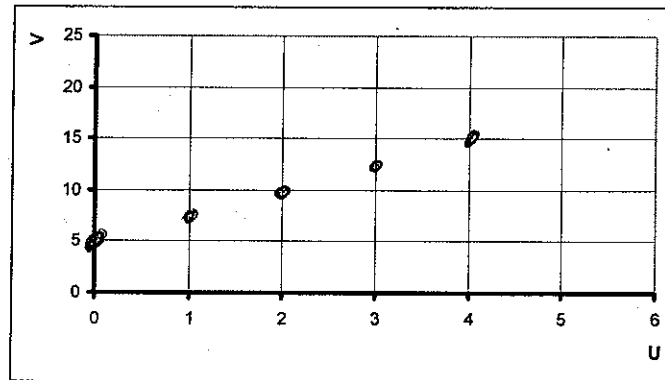


1. (8 points) Consider the relationship expressed in the table below.

ΔU	U	V	ΔV
	0	5	
1	1	7.5	2.5
1	2	10	2.5
1	3	12.5	2.5
1	4	15	2.5



- Plot the data points using the grid provided above.
- Use the space below to explain and show how to determine a functional equation for the relationship between the values of V and U.

my slope = $\frac{\Delta V}{\Delta U} = 2.5$
 my intercept is 5 $\Rightarrow V = 2.5U + 5$

- Show how to use your functional equation to find the value of V when U = 10.

$U = 10 \Rightarrow V = (2.5)(10) + 5$
 $V = 30$

- Show how to use your functional equation to find the value of U when V = 45.

$V = 45 \Rightarrow 45 = 2.5U + 5$
 $40 = 2.5U$
 $U = 16$

2. (8 points) Consider the relationship expressed in the table below. Assume the observed pattern of differences continues indefinitely.

Δn	n	C_n	ΔC	$\Delta \Delta C$
	0	2	8	6
1	1	10	14	6
1	2	24	20	6
1	3	44	26	6
1	4	70	32	6
1	5	102		

- Complete the table by entering the values for C_0 and C_5 .
- Complete the following rule that specifies a difference equation for the relationship.

$C_0 = 2$
 $C_n = C_{n-1} + 6n + 2$

- Complete the following rule to specify an explicit functional equation for this relationship.

$C_n = 3n^2 + 5n + 2$

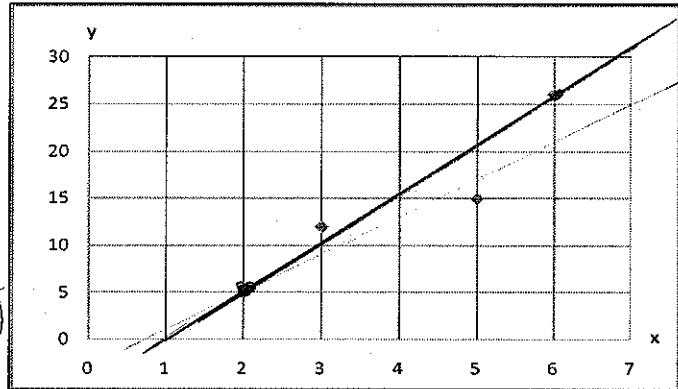
$2a = 6 \Rightarrow a = 3$
 $4 + b = 8 \Rightarrow b = 5$
 $c = 2$

3. (8 points) Some data values are plotted on the graph below. Sketch a line that you think provides a pretty good fit to the data.

ONE POSSIBLE SOLUTION

- Show how to find an equation for the line you drew. Write out that equation.
- Comment on how well your line fits the data by finding your average absolute error.
- Show how to use your equation to estimate a predicted value for y when $x = 15$.

x	y	My Line Predicts	Error
2	5	5	0
3	12	10.25	1.75
5	15	20.75	5.75
6	26	26	0
15	73.25		



Two points on my line

$$\begin{array}{c|c} x & y \\ \hline 2 & 5 \\ 6 & 26 \end{array} \quad \checkmark \quad m = \text{my slope} = \frac{21}{4}$$

$$m = 5.25$$

$$\text{My intercept } b$$

$$5 = 5.25(2) + b$$

$$5 = 10.5 + b$$

$$-5.5 = b$$

$$\text{My equation: } y = 5.25x - 5.5$$

$$x = 15 \Rightarrow y = 5.25 \times 15 - 5.5 = 73.25$$

$$\text{My Ave Error} = 7.875$$

4. (8 points) Suppose B_t denotes the number of bacteria (in thousands) in a culture after t hours of growth, and suppose the relationship between B_t and t is given in the following table.

t	0	1	2	3	4
B_t	250	350	490	686	960.4

ratios

1.4

1.4

1.4

1.4

- Complete the table by predicting how many thousands of bacteria will be present in the culture after 4 hours of growth.

- Complete the following rule that specifies a difference equation for the relationship.

$$B_0 = 250$$

$$B_t = B_{t-1} \times 1.4$$

- Complete the following rule to specify an explicit functional equation for this relationship.

$$B_t = 250(1.4)^t$$

