Alexandria University

Faculty of Engineering

C-Programming

Electrical Engineering Department

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Assignment 6

Pointers

1. Write grammatical errors correction program. The program scans a variable length line from the user such that the end of the line is identified by detecting new line character '\n'. Then, the program finds all occurrences of "is", "are", "he", "she", "it", and "we". Afterward, the program checks if the used verb is correct or not. If it is not correct, a message is printed with the total number of "is" and "are" misuse and the corrected sentence. Otherwise, the program prints that the sentence is grammatically correct. Test the program using the sentences given in Table. 1.

Sample Input	Expected Output
We is going to play football tomorrow.	**Grammatical Errors:** 1 **Corrected Sentence:** We are going to play football tomorrow.
Since, it are cloudy today. We is not going to school.	**Grammatical Errors:** 2 **Corrected Sentence:** Since, it is cloudy today. We are not going to school.
He is studying for next week mid-term exams.	**The sentence is grammatically correct!**

Table. 1. Sample input sentences and outputs.

2. Write a program that fits a line to the data points stored in two equal-sized vectors $x, y \in \mathbb{R}^n$. Initially, the user inputs the size of the vectors n. Then, the program reads the elements of both the vectors. Next, a line is fitted using the equations given below. Finally, the line in $y = a + bx$ format with the estimated parameters is displayed to the user. Test the program using the data-points given in Table .2.

Fitted line equation:

$$y = a + bx$$

$$a = \bar{y} - b\bar{x} \quad (2)$$

$$\bar{x} = \frac{\sum_{i=1}^{n} x}{n}$$

$$\bar{y} = \frac{\sum_{i=1}^{n} y}{n}$$

$$b = \frac{n\sum yx - \sum x \sum y}{n\sum x^2 - (\sum x)^2} \quad (3)$$

Where, $\bar{x}$ is the average of all x data-points; $\bar{y}$ represents the average of all y data-points; a is the estimated line intercept such that its value is estimated using (2); b is the estimated slope, its value is estimated using (3).

Test data-points	
$x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$	$y = \begin{bmatrix} 2 \\ 4 \\ 9 \end{bmatrix}$

Table. 2. Sample data-points for line fitting.

3. Write a program to implement a gray code counter for any arbitrary number of bits. At first, the program requests the user to input the number of bits. Then, the program finds all the possible combinations arranged in ascending order. Afterwards, the combinations are stored in an array. Finally, all the stored values in the array are printed each in a new line. Test the program using the two-cases given in Table. 3.

Input	Output
2	00 01 11 10
3	000 001 011 010 110 111 101 100

Table. 3. Sample input number of bits and output gray code.