Function Related Problems

(Total 20 questions)

<table>
<tr><th>SL</th><th>Problem statement</th><th>Difficulty levels</th></tr>
<tr><td><b>1.</b></td><td>Function to print a custom message.
<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td></td><td>This is a function</td></tr>
</table>
</td><td>*</td></tr>
<tr><td><b>2.</b></td><td>Function to print an input character value.
<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>3</td><td>Value received from main: 3</td></tr>
<tr><td>A</td><td>Value received from main: A</td></tr>
</table>
</td><td>*</td></tr>
<tr><td><b>3.</b></td><td>Function to calculate the sum of <b>n</b> numbers coming from the console.
<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>80   33   27</td><td>Sum In Function: 140
Sum In Main: 140</td></tr>
<tr><td>100   -100</td><td>Sum In Function: 0
Sum In Main: 0</td></tr>
</table>
</td><td>*</td></tr>
<tr><td><b>4.</b></td><td>Function to calculate the sum of <b>n</b> numbers coming from the console and stored in an array.
<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>3
80   33   27</td><td>Sum In Function: 140
Sum In Main: 140</td></tr>
<tr><td>2
100   -100</td><td>Sum In Function: 0
Sum In Main: 0</td></tr>
</table>
</td><td>*</td></tr>
<tr><td><b>5.</b></td><td>Function to swap two numbers.
(<b>Restriction:</b> Pass by value)
<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>10   20</td><td>Value in func: 20   10
Value in main: 10   20</td></tr>
</table>
</td><td>*</td></tr>
</table>

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<table>
<tr><td></td><td></td><td></td></tr>
<tr><td><b>6.</b></td><td>Function to swap two numbers.
(<b>Restriction:</b> Pass by reference)<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>10 20</td><td>Value in func: 20 10
Value in main: 20 10</td></tr></table></td><td>**</td></tr>
<tr><td><b>7.</b></td><td>Function to determine only even numbers in an array of input integers.<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>24 77 117 -512 1024</td><td>24 -512 1024</td></tr><tr><td>45 33 0 256</td><td>0 256</td></tr></table></td><td>*</td></tr>
<tr><td><b>8.</b></td><td>Function that finds and returns the minimum value in an array.<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>157 -28 -37 26 10</td><td>Minimum Value: -37</td></tr><tr><td>12 45 1 10 5 3 22</td><td>Minimum Value: 1</td></tr></table></td><td>**</td></tr>
<tr><td><b>9.</b></td><td>Function that multiplies the array elements by 2 and returns the array.<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>157 -28 -37 26 10</td><td>314 -56 -74 52 20</td></tr><tr><td>12 45 1 10 5 3 22</td><td>24 90 2 20 10 6 44</td></tr></table></td><td>*</td></tr>
<tr><td><b>10.</b></td><td>Function to sort and return an input array in ascending order.<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td>10 22 -5 117 0</td><td>-5 0 10 22 117</td></tr></table></td><td>**</td></tr>
</table>

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11. Function **“IsPrime()”** to determine whether a number is prime or not.

Sample input	*Sample output*
1	Not prime
2	Prime
11	Prime
39	Not prime
101	Prime

**

12. Function **“GeneratePrime()”** to compute the prime numbers less than **N,** where **N** is an input integer. **GeneratePrime()** uses **IsPrime()** to check whether a number is prime or not.

Sample input	**Sample output**
5	Prime less than 5: 2, 3
10	Prime less than 10: 2, 3, 5, 7
40	Prime less than 17: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

***

13. Function **“GenNthPrime()”** to compute the **N**th prime number**,** where **N** is an integer input.

Sample input	**Sample output**
5	5th Prime: 11
10	10th Prime: 29
40	40th Prime: 173

***

14. Implement the following functions and calculate standard deviation of an array whose values come from the terminal-

TakeInput()
CalcMean(array, num_of_elem)
Calc_Std_deviation(array, num_of_elem)

Formula: $\sigma = \sqrt{\frac{\sum (x-M)^2}{N}}$

Sample input	**Sample output**
4 5 5 4 4 2 2 6	1.32
600 470 170 430 300	147.32

***

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<table>
<tr><td><b>15.</b></td><td>Function <b>find_substr( )</b> that takes two string arrays (<b>a, b</b>) as parameters, returns 1 if string <b>b</b> is found anywhere in string <b>a</b>, or returns –1 if no match is found.

(Assuming, strlen(a)>strlen(b))

<table>
<tr><th>Sample input (a, b)</th><th>Sample output</th></tr>
<tr><td>madam adam</td><td>1</td></tr>
<tr><td>telescope less</td><td>0</td></tr>
<tr><td>101010 101</td><td>1</td></tr>
</table></td><td>**</td></tr>
<tr><td><b>16.</b></td><td>Function <b>find_substr( )</b> that takes two string arrays (<b>a, b</b>) as parameters, uses function <b>str_length()</b> to determine the lengths of the strings, and then looks for the smaller string anywhere in the bigger string. It returns 1 if the substring is found, or returns –1 if no match is found.

<b>[Restriction:</b> str_length() cannot uses built-in strlen() function]

<table>
<tr><th>Sample input (a, b)</th><th>Sample output</th></tr>
<tr><td>madam adam</td><td>1</td></tr>
<tr><td>telescope less</td><td>0</td></tr>
<tr><td>101010 101</td><td>1</td></tr>
</table></td><td>***</td></tr>
<tr><td><b>17.</b></td><td>Program that continuously takes two positive integers as inputs and uses two functions to find their GCD (greatest common divisor) and LCM (least common multiple). Both functions take parameters and returns desired values.

[<b>Hint:</b> Use infinite loop to process inputs]

<table>
<tr><th><i>Sample input</i></th><th><i>Sample output</i></th></tr>
<tr><td>5 7</td><td>GCD: 1
LCM: 35</td></tr>
<tr><td>12 12</td><td>GCD: 12
LCM: 12</td></tr>
<tr><td>12 32</td><td>GCD: 4
LCM: 96</td></tr>
</table></td><td>**</td></tr>
</table>

<table>
<tr>
<td><b>18.</b></td>
<td>Program that implements function to perform operations on a 3X5 matrix:

<i>InputMatrix()</i>
<i>ShowMatrix()</i>
<i>ScalarMultiply()</i>

<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>7 16 55 13 12
12 10 52 0 7
-2 1 2 4 9

2</td><td>Original:
7 16 55 13 12
12 10 52 0 7
-2 1 2 4 9

Multiplied by 2:
14 32 110 26 24
24 20 104 0 14
-4 2 4 8 18</td></tr>
<tr><td>7 16 55 13 12
12 10 52 0 7
-2 1 2 4 9

-1</td><td>Original:
7 16 55 13 12
12 10 52 0 7
-2 1 2 4 9

Multiplied by -1:
-14 -32 -110 -26 -24
-24 -20 -104 0 -14
4 -2 -4 -8 -18</td></tr>
</table>
</td>
<td>***</td>
</tr>
<tr>
<td><b>19.</b></td>
<td>Program that implements function to perform operations on a <b>MXN</b> matrix:

<i>InputMatrix()</i>
<i>ShowMatrix()</i>
<i>ScalarMultiply()</i>

<table>
<tr><th>Sample input</th><th>Sample output</th></tr>
<tr><td>2 2

7 16
12 10

2</td><td>Original:
7 16
12 10

Multiplied by 2:
14 32
24 20</td></tr>
</table>
</td>
<td>****</td>
</tr>
</table>

3 5
 	
7 16 55 13 12
12 10 52 0 7
-2 1 2 4 9
 	
-1
	Original:
	7 16 55 13 12
	12 10 52 0 7
	-2 1 2 4 9
	
	Multiplied by -1:
	-14 -32 -110 -26 -24
	-24 -20 -104 0 -14
	4 -2 -4 -8 -18

20. Program to convert a positive integer to another base using the following functions- ****

I. Get_Number_And_Base () : Takes number to be converted (N) and base value (B) from user. Base must be between 2 and 16.

II. Convert_Number () : Does the conversion

III. Show_Converted_Number() : Displays the converted value.

Sample input(N,B)	**Sample output**
100 8	144
512 16	200
512 0	Base not within proper range!

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