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CSO 101 LAB ASSIGNMENT-3: DECISION MAKING AND BRANCHING

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SOLUTIONS

- 1) Write a C program to implement a calculator which performs +, -, \, * operations using switch case.

CODE:

```
1  #include<stdio.h>
2  int main()
3  {
4      int i;
5      float a,b;
6      char ch;
7      printf("Enter numbers a, b and an operator from [+,-,*,/] respectively: ");
8      scanf("%f %f %c",&a,&b,&ch);
9      i=(int)ch;
10     //ASCII values of +:53 -:55 *:52 /:57
11     switch(i)
12     {
13         case 43:
14             printf("%f %c %f= %f",a,ch,b,a+b);
15             break;
16         case 45:
17             printf("%f %c %f= %f",a,ch,b,a-b);
18             break;
19         case 42:
20             printf("%f %c %f= %f",a,ch,b,a*b);
21             break;
22         case 47:
23             printf("%f %c %f= %f",a,ch,b,a/b);
24             break;
25     }
26     return 0;
27 }
```

OUTPUT:

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q1.c -o q1 } ; if ($?) { .\q1 }
Enter numbers a, b and an operator from [+, -, *, /] respectively: 45 23 +
45.000000 + 23.000000 = 68.000000
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q1.c -o q1 } ; if ($?) { .\q1 }
Enter numbers a, b and an operator from [+, -, *, /] respectively: 34 56 -
34.000000 - 56.000000 = -22.000000
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q1.c -o q1 } ; if ($?) { .\q1 }
Enter numbers a, b and an operator from [+, -, *, /] respectively: 45 8 *
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q1.c -o q1 } ; if ($?) { .\q1 }
Enter numbers a, b and an operator from [+, -, *, /] respectively: 34 170 /
34.000000 / 170.000000 = 0.200000
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> █
```

2) Write a C program to get marks from the user and assign the following grades and print it.

MARKS	GRADE
<50	F
50-70	C
70-90	B
>90	A

CODE:

```
1  #include<stdio.h>
2  int main()
3  {
4      int mk;
5      printf("Enter marks: ");
6      scanf("%d",&mk);
7      if (mk>90)
8          printf("Graded A");
9      else if ((mk>70)&&(mk<91))
10         printf("Graded B");
11     else if((mk>49)&&(mk<71))
12         printf("Graded C");
13     else
14         printf("Graded F");
15     return 0;
16 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q2.c -o q2 } ; if ($?) { .\q2 }
Enter marks: 96
Graded A
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q2.c -o q2 } ; if ($?) { .\q2 }
Enter marks: 45
Graded F
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> █
```

3) Write a C program to print if a number is odd or even.

CODE:

```
1  #include<stdio.h>
2  √ int main()
3  {
4      int n;
5      printf("Enter a number: ");
6      scanf("%d",&n);
7  √  if (n%2==0)
8      {
9          printf("even");
10     }
11  √  else
12     {
13         printf("odd");
14     }
15     return 0;
16 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3\" ; if ($?) { gcc q3.c -o q3 } ; if ($?) { .\q3 }
Enter a number: 21
odd
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3\" ; if ($?) { gcc q3.c -o q3 } ; if ($?) { .\q3 }
Enter a number: 12
even
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> |
```

4) Write a C program to find the roots of a quadratic equation. You should print the roots even if they are complex.

CODE:

```
1 #include<stdio.h>
2 #include<math.h>
3 int main()
4 {
5     printf("The quadratic equation is of the form ax^2 + bx + c = 0\n");
6     printf("Enter a, b and c respectively: ");
7     int a,b,c;
8     scanf("%d %d %d",&a,&b,&c);
9     printf("The quadratic equation is %dx^2 + %dx + %d = 0\n",a,b,c);
10    float dis=((b*b)-(4*a*c));
11    if (dis==0)
12    {
13        printf("The roots are real and equal.\n");
14        printf("They are %.3f and %.3f\n",(float)(-b)/(2*a),(float)(-b)/(2*a));
15    }
16    else if (dis>0)
17    {
18        printf("The roots are real.\n");
19        printf("They are %.3f and %.3f\n",(float)((-b+sqrt(dis))/(2*a)),(float)((-b-sqrt(dis))/(2*a)));
20    }
21    else
22    {
23        printf("The roots are imaginary.\n");
24        printf("They are %.3f+%.3fi and %.3f-%.3fi\n",(float)(-b)/(2*a),(float)((sqrt(-dis))/(2*a)),(float)(-b)/(2*a),(float)((sqrt(-dis))/(2*a)));
25    }
26    return 0;
27 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q4.c -o q4 } ; if ($?) { .\q4 }
The quadratic equation is of the form ax^2 + bx + c = 0
Enter a, b and c respectively: 1 2 1
The quadratic equation is 1x^2 + 2x + 1 = 0
The roots are real and equal.
They are -1.000 and -1.000
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q4.c -o q4 } ; if ($?) { .\q4 }
The quadratic equation is of the form ax^2 + bx + c = 0
Enter a, b and c respectively: 1 1 1
The quadratic equation is 1x^2 + 1x + 1 = 0
The roots are imaginary.
They are -0.500+0.866i and -0.500-0.866i
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q4.c -o q4 } ; if ($?) { .\q4 }
The quadratic equation is of the form ax^2 + bx + c = 0
Enter a, b and c respectively: 1 4 3
The quadratic equation is 1x^2 + 4x + 3 = 0
The roots are real.
They are -1.000 and -3.000
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> █
```

5) Write a C program to implement the modulus function without using modulo operator.

CODE:

```
1  #include<stdio.h>
2  int modulo(int n, int d)
3  {
4      int quo=n/d;
5      int rem=n-(d*quo);
6      return rem;
7  }
8  int main()
9  {
10     int n,d;
11     printf("Enter the dividend and the divisor respectively: ");
12     scanf("%d %d",&n,&d);
13     int rem=modulo(n,d);
14     printf("The remainder is %d",rem);
15     return 0;
16 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q5.c -o q5 } ; if ($?) { .\q5 }
Enter the dividend and the divisor respectively: 5 2
The remainder is 1
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> |
```

6) Write a C program to test if the numbers entered can form sides of a triangle or not.

CODE:

```
1  #include<stdio.h>
2  int main()
3  {
4      int a,b,c;
5      printf("Enter the length of three sides of the triangle: ");
6      scanf("%d %d %d",&a,&b,&c);
7      if (((a+b)>c)&&((b+c)>a)&&((c+a)>a))
8          printf("they form the sides of a triangle");
9      else
10         printf("they do not form the sides of a triangle");
11     return 0;
12 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q6.c -o q6 } ; if ($?) { .\q6 }
Enter the length of three sides of the triangle: 3 4 5
they form the sides of a triangle
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q6.c -o q6 } ; if ($?) { .\q6 }
Enter the length of three sides of the triangle: 2 3 8
they do not form the sides of a triangle
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> |
```

7) Write a C program to print the name given numeric value of a month. For example it should print November if 11 is entered and error if any number less than 1 or greater than 12 is entered.

CODE:

```
1  #include<stdio.h>
2  int main()
3  {
4      int n;
5      printf("Enter a numeric value for a month: ");
6      scanf("%d",&n);
7      if (n==1)
8          printf("January");
9      else if (n==2)
10         printf("February");
11     else if (n==3)
12         printf("March");
13     else if (n==4)
14         printf("April");
15     else if (n==5)
16         printf("May");
17     else if (n==6)
18         printf("June");
19     else if (n==7)
20         printf("July");
21     else if (n==8)
22         printf("August");
23     else if (n==9)
24         printf("September");
25     else if (n==10)
26         printf("October");
27     else if (n==11)
28         printf("November");
29     else if (n==12)
30         printf("December");
31     else
32         printf("Invalid number");
33     return 0;
34 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3\" ; if ($?) { gcc q7.c -o q7 } ; if ($?) { .\q7 }
Enter a numeric value for a month: 02
February
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3\" ; if ($?) { gcc q7.c -o q7 } ; if ($?) { .\q7 }
Enter a numeric value for a month: 56
Invalid number
PS C:\Users\91933\Documents\CS0\Assignments\Lab assignments\S3> |
```


8) Write a C program to find if a given year is leap year or not.

CODE:

```
1  #include<stdio.h>
2  int main()
3  {
4      int year;
5      printf("Enter a year: ");
6      scanf("%d",&year);
7      if ((year%4)==0)
8      {
9          if ((year%100)==0)
10         {
11             if ((year%400)==0)
12                 printf("Leap Year");
13             else
14                 printf("Not a leap year");
15         }
16         else
17             printf("Leap Year");
18     }
19     else
20         printf("Not a leap year");
21     return 0;
22 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q8.c -o q8 } ; if ($?) { .\q8 }
Enter a year: 2021
Not a leap year
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q8.c -o q8 } ; if ($?) { .\q8 }
Enter a year: 2012
Leap Year
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q8.c -o q8 } ; if ($?) { .\q8 }
Enter a year: 2100
Not a leap year
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> |
```


9) Write a C program to print the sine of the value entered if choice is 1 or cosine if choice is 2. If any other value is entered, then it should return tan of the value.

CODE:

```
1  #include<stdio.h>
2  #include<math.h>
3  int main()
4  {
5      int ch;
6      float angd,ang;
7      printf("Enter choice (1:sine, 2:cosine, any other number:tangent): ");
8      scanf("%d",&ch);
9      printf("Enter angle in degrees: ");
10     scanf("%f",&angd);
11     ang=((angd)*(22.0/7.0)/180.00);
12     if (ch==1)
13     {
14         printf("sin(%f) = %.2f",ang,sin(ang));
15     }
16     else if (ch==2)
17     {
18         printf("cos(%f) = %.2f",ang,cos(ang));
19     }
20     else
21     {
22         printf("tan(%f) = %.2f",ang,tan(ang));
23     }
24     return 0;
25 }
```

OUTPUT:

```
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q9.c -o q9 } ; if ($?) { .\q9 }
Enter choice (1:sine, 2:cosine, any other number:tangent): 1
Enter angle in degrees: 45
sin(0.785714) = 0.71
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q9.c -o q9 } ; if ($?) { .\q9 }
Enter choice (1:sine, 2:cosine, any other number:tangent): 34
Enter angle in degrees: 60
tan(1.047619) = 1.73
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> cd "c:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3\" ; if ($?) { gcc q9.c -o q9 } ; if ($?) { .\q9 }
Enter choice (1:sine, 2:cosine, any other number:tangent): 2
Enter angle in degrees: 135
cos(2.357143) = -0.71
PS C:\Users\91933\Documents\CSO\Assignments\Lab assignments\S3> |
```