DSC
ASSESSMENT 1

Abdelrahman Helaly

Course 1. Session 2.1

Question 1

```c
/**
 * DSC Assessment 1
 * Solution By Abdelrahman Helaly
 */

// Question 1:
// Write a program that take two integers from the user and print the results of this question:
// Result = (num1 + num2)*3) - 10

#include <stdio.h>


int main(){

    // Declare the variables
    int num1, num2, result;

    // Propmt the user to enter two integers
    printf("Enter two integers: ");

    scanf("%d %d", &num1, &num2);
    result = ((num1 + num2)*3)-10;

    printf("Result: %i\n", num1 + num2);
    return 0;
}
```

Question 2

```c
/**
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 */

// Question 2:
// Write a program that print your name and your grade in a new line.

#include <stdio.h>

int main(){

    char* name;
    int grade;
    printf("Enter Your Name and Grade, EX: Helaly 50: ");
    
    scanf("%s", &name);
    scanf("%d", &grade);

    printf("Name: %s\n", &name);
    printf("Grade: %d\n", grade);
    
    return 0;
}
```

Question 3

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 3:
// Write a program for converting temperature from degrees Celsius to degrees Fahrenheit,
// given the formula:
// F = C x 9 / 5 + 32

#include <stdio.h>

int main(){

    float input, result;
    printf("Enter Templrature in Celsius: ");
    scanf("%f", &input);
    result = input * 9 / 5 + 32;
    printf("%.2f\n", result);
    return 0;
}
```

Question 4

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 4:
// Write a program that reads the radius of a circle and
// calculates the area and circumference then prints the
// results.

#include <stdio.h>

#define PI 3.14159

int main(){

    float radius, area, circumference;

    // Prompt the user to enter Circule radius
    printf("Enter the circle radius: ");
    scanf("%f", &radius);

    // Calculate the Area
    area = PI*radius*radius;

    // Calculate The Circumference
    circumference = 2 * PI * radius;

    // Print Results
    printf("Circle Area: %.2f\n", area);
    printf("Circle Circumference: %.2f\n", circumference);

    return 0;
}
```

Question 5

```c
/**
 * DSC Assessment 1
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 */

// Question 5:
// Write a program to print the ASCII value of a character input by the user.

#include <stdio.h>
#include <stdbool.h>

int main(){

    char input;
    int charAsci;
    // Prompt the user to enter a Character
    printf("Enter Any Character: ");
    scanf("%c", &input);

    charAsci = (int)input;
    bool isValid = false;

    if(charAsci >= 97 && charAsci <= 122){
        isValid = true;
    } else if(charAsci >= 65 && charAsci <= 90){
        isValid = true;
    }

    if(isValid){
        printf("The ASCI code of %c is: %d\n", input, charAsci);
    } else {
        printf("Invalid Entry: Only characters a-z and A-Z allowed.\n", input, charAsci);
    }
    return 0;
}
```

Question 6

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 6:
// Write a program that print the relation between two
// integer number if those numbers are equal, not equal and
// which one contain the higher value.

// Solution Algorithm:
// Get Num1, Num2.
// SET relation = num1 - num2
// If relation is 0 then they are equal
// If relation is greater that zero then num1 is larger
// If relation is greater that zero then num1 is smaller

#include <stdio.h>

int main(){
    int num1, num2, relation;

    // Prompt the user to enter a Character
    printf("Enter the first number: ");
    scanf("%d", &num1);
    printf("Enter the second number: ");
    scanf("%d", &num2);


    relation = num1 - num2;
    if(relation == 0){
        printf("Both numbers are equal.\n");
    }else if(relation > 0){
        printf("The first number (%d) is greater than the second one(%d).\n", num1, num2);
    }else {
        printf("The first number (%d) is smaller than the second one (%d).\n", num1, num2);
    }

    return 0;
}
```

Question 7

```c
/**
 * DSC Assessment 1
 * Solution By Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 7:
// Write a program that print the relation between two
// integer number if those numbers are equal, not equal and
// which one contain the higher value.

#include <stdio.h>

int main(){
    int theSmallest, nums[3], i;
    // Prompt the user to enter three numbers
    printf("Enter the first number: ");
    scanf("%d", &nums[0]);
    
    printf("Enter the second number: ");
    scanf("%d", &nums[1]);

    printf("Enter the third number: ");
    scanf("%d", &nums[2]);

    // Suppose that the first number is the smallest
    theSmallest = nums[0];
    for(i=1; i<=2; i++){
        if(nums[i] < theSmallest){
            theSmallest = nums[i];
        }
    }
    printf("The smallest number is: %d\n", theSmallest);

    return 0;
}
```

Question 8

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 8:
// Write a program that reads a positive integer and
// checks if it is a perfect square.

// Solution Algorithem:
// INPUt NUMBER
// Get the Absolute value of the Square root of the NUMBER
// Multiply the square root by itself
// If the product is equal to the original number THEN the number is perfect.

#include <stdio.h>
#include <math.h>

int main(){
    int input, theSquareRoot;

    // Prompt the user to enter a positive number
    printf("Enter a positive number: ");
    scanf("%d", &input);

    if(input <= 0){
        printf("Invalid Number, Only positive numbers allowed\n");
        return 0;
    }

    // Get the square root of the number, with ignoring the fractions
    theSquareRoot = (int)sqrt((double)input);

    if((theSquareRoot * theSquareRoot) == input){
        printf("The number %d is a perfect number\n", input);
    }else{
        printf("The number %d is NOT a perfect number\n", input);
    }
    return 0;
}
```

Question 9

```c
/**
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 */

// Question 9:
// Write a program that reads a student grade percentage
// and prints "Excellent" if his grade is greater than or equal
// 85, "Very Good" for 75 or greater; "Good" for 65, "Pass"
// for 50, "Fail" for less than 50.

#include <stdio.h>

int main(){
    int grade;

    // Prompt the user to enter a positive number
    printf("Enter your grade percentage: ");
    scanf("%d", &grade);

    if(grade >= 85){
        printf("Grade: Excellent\n");
    }else if(grade >= 75){
        printf("Grade: Very Good\n");
    }else if(grade >= 65){
        printf("Grade: Good\n");
    }else if(grade >= 50){
        printf("Grade: Pass\n");
    }else if(grade < 50){
        printf("Grade: Fail\n");
    }
    
    return 0;
}
```

Question 10

```c
/**
 * DSC Assessment 1
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 */

// Question 10:
// Write a program to make a simple calculator using
// switch-case. The calculator takes the operation
// (+ or - or * or /) and takes the two input arguments and
// print the results.

#include <stdio.h>

int main(){
    char operator;
    float num1, num2,result;

    // Prompt the user to enter a positive number
    printf("Enter mathematical operation Ex: 10 + 5: \n");
    printf("Allowed operators: + - * / \n");
    scanf("%f %c %f", &num1, &operator, &num2);

    switch(operator){
        case '+':
            result = num1 + num2;
        break;
        case '-':
            result = num1 - num2;
        break;
        case '*':
            result = num1 * num2;
        break;
        case '/':
            result = num1 / num2;
        break;
        default:
            printf("Invalid Operation.");
            return 0;
    }
    printf("Result: %.2f\n", result);
    return 0;
}
```

Question 11

```c
/**
 * DSC Assessment 1
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 */

// Question 11:
// Print sum of first 100 integers. (With data validation)


#include <stdio.h>

#define limit 100

int main(){
    
    int i, numsum;
    for(i=1; i<=limit; i++){
        numsum+=i;
    }

    printf("The sum of the first %d numbers is: %d\n", limit, numsum);
    return 0;
}
```

Question 12

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 12:
// Write a program that reads a positive integer and computes the factorial.


#include <stdio.h>

#define limit 10

int main(){

    int i;
    unsigned long long factorial = 1, input;
    
    printf("Enter a positive number: ");
    scanf("%llu", &input);

    for(i=1; i<=input; i++){
        factorial*=i;
    }

    printf("The Factorial of number %d is: %llu\n", input, factorial);
    return 0;
}
```

Question 13

```c
/**
 * DSC Assessment 1
 * Solution By: Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 13:
// Write a program that reads a positive integer and checks if it is a prime.

#include <stdio.h>
#include <stdbool.h>

#define limit 10

int main(){

    int i, input;
    bool isPrime = 1; // Asume the number is prime
    
    printf("Enter a positive number: ");
    scanf("%d", &input);

    for(i=input-1; i>=2; i--){
        if(input % i == 0){
            isPrime = 0; // Then the number is not prime
            break; // No need to continue the loop
        }
    }

    if(isPrime){
        printf("The number %d is a Prime number\n", input);
    } else {
        printf("The number %d is NOT a Prime number\n", input);
    }
    return 0;
}
```

Question 14

```c
/**
 * DSC Assessment 1
 * Solution By Abdelrahman Helaly <AH3laly@gmail.com>
 */

// Question 14:
// Write a program to display English alphabets from A to Z.


#include <stdio.h>

#define limit 10

int main(){

    char c;

    for(c = 'A'; c <= 'Z'; c++){
        printf("%c ", c);
    }

    printf("\n");

    return 0;
}
```

Question 15

```c
/**
 * DSC Assessment 1
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 */

// Question 15:
// Write a program to calculate the power of a number.
// The number and its power are input from user.


#include <stdio.h>

int main(){

    int num, exponent, result = 1, i;
    
    printf("Enter a Number and the Exponent Ex: 10 15: ");
    scanf("%d %d", &num, &exponent);

    for(i=1; i<=exponent; i++){
        result*=num;
    }

    printf("The Exponent %d of the number %d is %d\n", exponent, num, result);

    return 0;
}
```

Question 16

```c
/**
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 */

// Question 16:
// Write a program to reverse a number.

#include <stdio.h>

int main(){

    int input, rightMost, result = 0;

    printf("Enter a number to reverse: ");
    scanf("%d", &input);

    while(input != 0){
        // Get the first number
        rightMost = input % 10;

        // Remove the first number
        input /= 10;

        // Add Zero to right most
        result *= 10;

        // Replace the Right Most zero with the first number
        result += rightMost;
    }

    printf("Result: %d\n", result);
    return 0;
}
```

Question 17

```c
/**
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 */

// Question 17:
// Write a program to count number of digits in a decimal number.

#include <stdio.h>
#include <stdbool.h>

int main(){
    int theNumber, theNumberCount = 0, theFractionCount = 0, temp;
    long double input, theFraction;
    bool pointDetected = false;
    char c;
    
    //Prompt the user to enter a decimal number
    printf("Enter a decimal number, Ex: 2367632.4387284: ");

    while((c = getchar()) != '\n'){
        if((int)c == 46){
            pointDetected = true;
        }else if(pointDetected){
            theFractionCount++;
        }else {
            theNumberCount++;
        }
    }
    
    printf("Integer Digits: %d\n", theNumberCount);
    printf("Fraction Digits: %d\n", theFractionCount);
    printf("Total Digits: %d\n", theNumberCount + theFractionCount);
    return 0;
}
```

Question 18

```c
/**
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 */

// Question 18:
// Write a program to display half pyramid using stars pattern.
// *
// * *
// * * *
// * * * *
// * * * * *

#include <stdio.h>

// We can change the pyramid size here
#define PYRAMID_SIZE 5

int main(){

    int r, c, rows = PYRAMID_SIZE;
    
    for(r=1; r<=rows; r++){
        for(c=1; c<=r; c++){
            printf("* ");
        }
        printf("\n");
    }
    
    return 0;
}
```

Question 19

```c
/**
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 */

// Question 19:
// Write a program to display inverted half pyramid usingstars pattern.
// * * * * * *
// * * * * *
// * * * *
// * * *
// * *

#include <stdio.h>

// We can change the pyramid size here
#define PYRAMID_SIZE 5

int main(){

    int r, c, rows = PYRAMID_SIZE;

    for(r=rows; r>=1; r--){
        for(c=1; c<=r; c++){
            printf("* ");
        }
        printf("\n");
    }

    return 0;
}
```

Question 20

```c
//.Question.20:
//.Write.a.program.to.display.a.full.pyramid.using.stars.pattern.
//.....*
//....***
//...*****
//..*******
//.*********

#include.<stdio.h>

//.We.can.change.the.pyramid.size.here
#define.PYRAMID_BASE_SIZE.9

int.main(){
....int.indents,.stars,.levels,.r,.c,.s;

....indents.=.PYRAMID_BASE_SIZE./.2;
....stars.=.1;
....levels.=.indents.+.1;

....for(r=1;.r<=levels;.r++){
....
........for(c=1;.c<=indents;.c++){.//.Print.the.Indentations
............printf(".");
........}
........for(s=1;.s<=stars;.s++){.//.Print.Stars
............printf("*");
........}
........
........indents--;
........stars+=2;
........printf("\n");
....}
....return.0;
}
```

Question 21

```c
#include <stdio.h>

// We can change the size of the shape here
#define SHAPE_SIZE 10

int main(){
    int width, height, r, c, star1, star2;
    width = SHAPE_SIZE;
    
    if(SHAPE_SIZE % 2 == 0){ // I Like the number to be odd
        width+=1;
    }
    height = width;
    star1=1;
    star2=width;
    
    for(r=1; r<=height; r++){
        if((star1 - star2) == 0){
            star1++;
            star2--;
            continue;
        }
        for(c=1; c<=width; c++){
            if(c == star1 || c == star2){
                printf("*");
            }else {
                printf(".");
            }
        }
        star1++;
        star2--;
        printf("\n");
    }
    return 0;
}
```