Day 06 (set-A) Assignment Solutions

(Submitted By: RUPESH ROY)

1. Write a program that takes a command-line argument n and prints a table of the powers of 2 that are less than or equal to 2^n.

Code:

```
#!/bin/bash/
n=$@
echo "argument value is "$n
powerOfTwo=1
for (( i=1; i<=$n; i++ ))
do
        powerOfTwo=$(( 2*$powerOfTwo ))
        echo "2^"$i "=" $powerOfTwo
done
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que1.sh 5
argument value is 5
2^1 = 2
2^2 = 4
2^3 = 8
2^4 = 16
2^5 = 32
```

2. Write a program that takes a command-line argument n and prints the nth harmonic number. Harmonic Number is of the form-

$$H_n = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots + \frac{1}{n}.$$

Code:

```
#!/bin/bash/
n=$@
printf "H"$n"= 1/1"
for (( i=1;i<$n;i++ ))
do
        printf " + 1/"$(($i + 1))
done
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que2.sh 5
H5= 1/1 + 1/2 + 1/3 + 1/4 + 1/5
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que2.sh 10
H10= 1/1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 + 1/9 + 1/10
```

3. Write a program that takes an input and determines if the number is a prime.

Code:

```
#!/bin/bash/
read -p "Enter number:" number
for (( i=2;i<$number;i++ ))
do
        if [ $(($number%$i)) -eq 0 ]
        then
                echo $number" is NOT a Prime Number"
                exit
        fi
done
echo $number" is a Prime Number"
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que3.sh
Enter number:21
21 is NOT a Prime Number

ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que3.sh
Enter number:13
13 is a Prime Number
```

4. Extend the program to take a range of number as input and output the Prime Numbers in that range.

Code:

```
#!/bin/bash/
read -p "Enter Lower-Bound:" low
read -p "Enter Upper-Bound:" upper
printf "Prime Numbers between $low and $upper are: "
for(( i=$low;i<=$upper;i++ ))
do
        for (( j=2;j<$i;j++ ))
        do
                if [ $(($i%$j)) -eq 0 ]
                then
                        flag=0
                        break
                else
                        flag=1
                fi
        done
 if [ $(($flag)) -eq 1 ]
        then
        printf $i" "
 fi
done
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que4.sh
Enter Lower-Bound:1
Enter Upper-Bound:10
Prime Numbers between 1 and 10 are: 3 5 7
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que4.sh
Enter Lower-Bound:1
Enter Upper-Bound:20
Prime Numbers between 1 and 20 are: 3 5 7 11 13 17 19
```

5. Write a program that computes a factorial of a number taken as input.

5 Factorial – 5! = 1 * 2 * 3 * 4 * 5

Code:

```
#!/bin/bash/
read -p "Enter Number=" number
fact=1
for (( i=1;i<=$number;i++ ))
do
        fact=$(( $fact*$i ))
done
echo $number"! =" $fact
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que4.sh
Enter Number=4
4! = 24

ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ ./que4.sh
Enter Number=5
5! = 120
```

6. Write a program to compute Factors of a number N using prime factorization method.

Logic->Traverse till i*i <= N instead of i <= N for efficiency. O/P-> Print the prime factors of number N.

Code:

```
#!/bin/bash/
read -p "Enter Number:" number
printf "Prime Factors of $number are:"
while [[ $(($number%2)) -eq 0 ]]
do
        printf "2 "
        number=$(($number/2))
done
for (( i=3;i<$number;i+=2))
do
```

```
        while [[ $(($number%$i)) -eq 0 ]]
        do
                printf $i" "
                number=$(($number/$i))
        done
done
if [ $number -gt 2 ]
then
        printf $number
fi
```

OutPut:

```
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ sh que1_6.sh
Enter Number:24
Prime Factors of 24 are:2 2 2 3
ROY@ROY-PC MINGW64 ~/Desktop/DeskTop/shellPrograming/Day06Assignment (master)
$ sh que1_6.sh
Enter Number:315
Prime Factors of 315 are:3 3 5 7
```