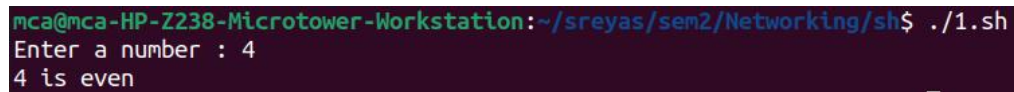


1) Write a Shell program to check the given number is even or odd.

**program:**

```
echo -n "Enter a number : "  
read n  
if [ `expr $n % 2` -eq 0 ]  
then  
    echo "$n is even"  
else  
    echo "$n is odd"  
fi
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './1.sh'. The script prompts 'Enter a number : ' and the user has entered '4'. The script outputs '4 is even'.

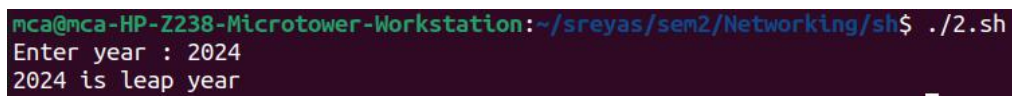
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./1.sh  
Enter a number : 4  
4 is even
```

2) Write a Shell program to check a leap year.

**program:**

```
echo -n "Enter year : "  
read n  
if [ `expr $n % 4` -eq 0 ] && [ `expr $n % 100` -ne 0 ] || [ `expr $n % 400` -eq 0 ]; then  
    echo "$n is leap year"  
else  
    echo "$n is not a leap year"
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './2.sh'. The script outputs 'Enter year : 2024' and then '2024 is leap year'.

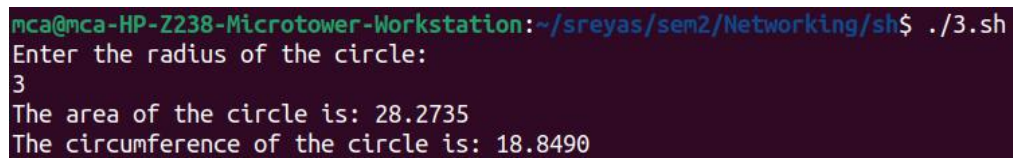
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./2.sh  
Enter year : 2024  
2024 is leap year
```

3) Write a Shell program to find the area and circumference of a circle.

**program:**

```
echo "Enter the radius of the circle:"
read radius
area=$(echo "3.1415 * ($radius ^ 2)" | bc)
circumference=$(echo "2 * 3.1415 * $radius" | bc)
echo "The area of the circle is: $area"
echo "The circumference of the circle is: $circumference"
```

**output:**



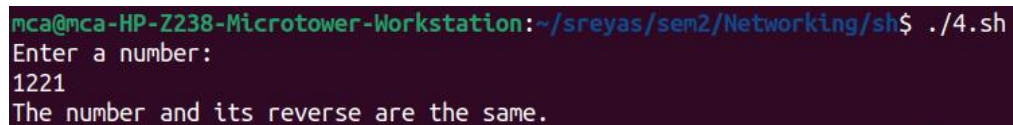
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./3.sh
Enter the radius of the circle:
3
The area of the circle is: 28.2735
The circumference of the circle is: 18.8490
```

4) Write a Shell program to check the given number and its reverse are same.

**program:**

```
echo "Enter a number:"
read number
reverse=$(echo $number | rev)
if [ $number -eq $reverse ]; then
    echo "The number and its reverse are the same."
else
    echo "The number and its reverse are not the same."
fi
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './4.sh'. The script prompts 'Enter a number:' and the user has entered '1221'. The script outputs 'The number and its reverse are the same.'

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./4.sh
Enter a number:
1221
The number and its reverse are the same.
```

5) Write a Shell program to check the given string is palindrome or not.

**program:**

```
echo "Enter a string:"
read string
reverse=$(echo $string | rev)
if [ "$string" == "$reverse" ]; then
    echo "The string is a palindrome."
else
    echo "The string is not a palindrome."
fi
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has run './5.sh'. The script prompts 'Enter a string:', the user enters 'hellolleh', and the script outputs 'The string is a palindrome.'

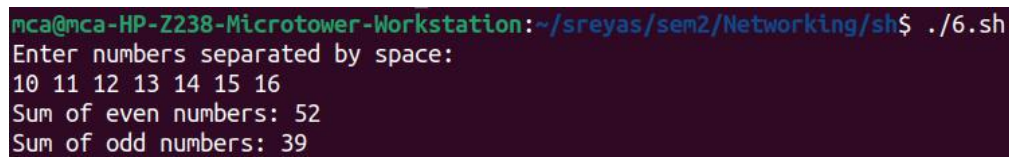
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./5.sh
Enter a string:
hellolleh
The string is a palindrome.
```

6) Write a Shell program to find the sum of odd and even numbers from a set of numbers.

**program:**

```
echo "Enter numbers separated by space:"
read -a numbers
sum_even=0
sum_odd=0
for num in "${numbers[@]}; do
    if [ $((num % 2)) -eq 0 ]; then
        sum_even=$((sum_even + num))
    else
        sum_odd=$((sum_odd + num))
    fi
done
echo "Sum of even numbers: $sum_even"
echo "Sum of odd numbers: $sum_odd"
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './6.sh'. The output of the script is displayed: 'Enter numbers separated by space:', followed by the input '10 11 12 13 14 15 16', then 'Sum of even numbers: 52' and 'Sum of odd numbers: 39'.

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./6.sh
Enter numbers separated by space:
10 11 12 13 14 15 16
Sum of even numbers: 52
Sum of odd numbers: 39
```

7) Write a Shell program to find the roots of a quadratic equation.

**program:**

```
echo "Enter the coefficients (a, b, c) of the quadratic equation (ax^2 + bx + c):"
read a b c
discriminant=$((b * b - 4 * a * c))
if [ $discriminant -gt 0 ]; then
    root1=$(echo "(-$b + sqrt($discriminant)) / (2 * $a)" | bc -l)
    root2=$(echo "(-$b - sqrt($discriminant)) / (2 * $a)" | bc -l)
    echo "The roots are real and different."
    echo "Root 1 = $root1, Root 2 = $root2"
elif [ $discriminant -eq 0 ]; then
    root=$(echo "-$b / (2 * $a)" | bc -l)
    echo "The roots are real and equal."
    echo "Root 1 = Root 2 = $root"
else
    real_part=$(echo "-$b / (2 * $a)" | bc -l)
    imaginary_part=$(echo "sqrt($((-1 * discriminant))) / (2 * $a)" | bc -l)
    echo "The roots are complex and different."
    echo "Root 1 = $real_part + $imaginary_part i"
    echo "Root 2 = $real_part - $imaginary_part i"
fi
```

**output:**

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./7.sh
Enter the coefficients (a, b, c) of the quadratic equation (ax^2 + bx + c):
1 10 2
The roots are real and different.
Root 1 = -.20416847668728045840, Root 2 = -9.79583152331271954159
```

8) Write a Shell program to check the given integer is Armstrong number or not.

**program:**

```
echo "Enter a number:"
read number
length=${#number}
sum=0
for ((i=0; i<$length; i++)); do
    digit=${number:i:1}
    sum=$((sum + digit ** length))
done
if [ $sum -eq $number ]; then
    echo "$number is an Armstrong number."
else
    echo "$number is not an Armstrong number."
fi
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './8.sh'. The script prompts 'Enter a number:' and the user has entered '153'. The script outputs '153 is an Armstrong number.'

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./8.sh
Enter a number:
153
153 is an Armstrong number.
```




9) Write a Shell program to check the given integer is prime or not.

**program:**

```
echo "Enter a number:"
read number
is_prime=true
if [ $number -lt 2 ]; then
    is_prime=false
fi
for ((i=2; i<=number/2; i++)); do
    if [ $((number % i)) -eq 0 ]; then
        is_prime=false
        break
    fi
done
if $is_prime; then
    echo "$number is a prime number."
else
    echo "$number is not a prime number."
fi
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './9.sh'. The script outputs 'Enter a number:', the user enters '23', and the script outputs '23 is a prime number.'


```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./9.sh
Enter a number:
23
23 is a prime number.
```

10) Write a Shell program to generate prime numbers between 1 and 50.

**program:**

```
echo "Prime numbers between 1 and 50 are:"
for ((i=2; i<=50; i++)); do
    is_prime=true
    for ((j=2; j<=i/2; j++)); do
        if [  $$(i \% j)$  -eq 0 ]; then
            is_prime=false
            break
        fi
    done
    if $is_prime; then
        echo $i
    fi
done
```

**output:**



A terminal window with a dark background and light green text. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The command './10.sh' has been executed. The output is 'Prime numbers between 1 and 50 are:' followed by a list of prime numbers: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, and 47, each on a new line.

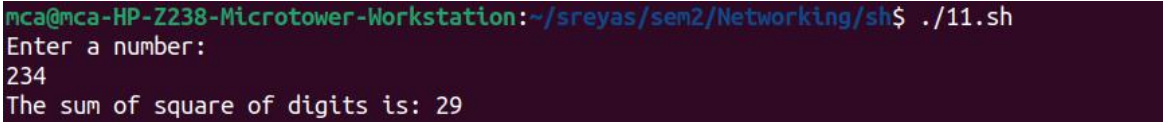
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./10.sh
Prime numbers between 1 and 50 are:
2
3
5
7
11
13
17
19
23
29
31
37
41
43
47
```

11) Write a Shell program to find the sum of square of individual digits of a number.

**program:**

```
echo "Enter a number:"
read num
sum=0
while [ $num -gt 0 ]; do
    digit=$(( $num % 10 ))
    sum=$(( $sum + $digit * $digit ))
    num=$(( $num / 10 ))
done
echo "The sum of square of digits is: $sum"
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './11.sh'. The script outputs 'Enter a number:', followed by the input '234'. Finally, it outputs 'The sum of square of digits is: 29'.

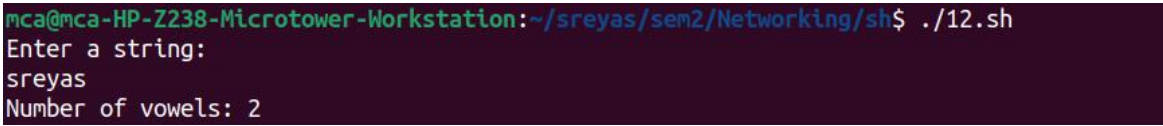
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./11.sh
Enter a number:
234
The sum of square of digits is: 29
```

12) Write a Shell program to count the number of vowels in a line of text.

**program:**

```
echo "Enter a string:"  
read str  
count=$(echo $str | grep -o -i "[aeiou]" | wc -l)  
echo "Number of vowels: $count"
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './12.sh'. The script prompts 'Enter a string:' and the user has entered 'sreyas'. The script then outputs 'Number of vowels: 2'.

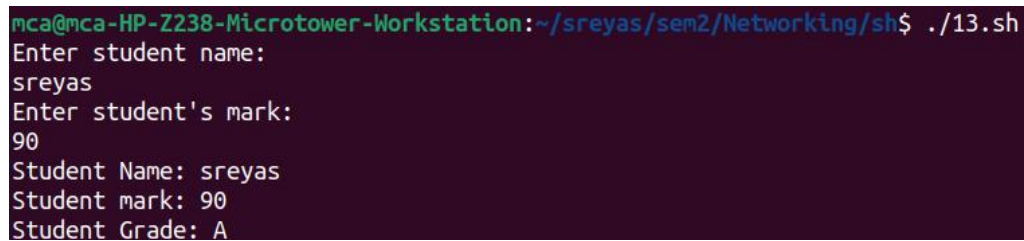
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./12.sh  
Enter a string:  
sreyas  
Number of vowels: 2
```

13) Write a Shell program to display student grades.

**program:**

```
calculate_grade() {  
    if [ $1 -ge 90 ]; then  
        grade="A"  
    elif [ $1 -ge 80 ]; then  
        grade="B"  
    elif [ $1 -ge 70 ]; then  
        grade="C"  
    elif [ $1 -ge 60 ]; then  
        grade="D"  
    else  
        grade="F"  
    fi  
    echo $grade  
}  
  
echo "Enter student name:"  
read name  
echo "Enter student's mark:"  
read mark  
  
grade=$(calculate_grade $mark)  
  
echo "Student Name: $name"  
echo "Student mark: $mark"  
echo "Student Grade: $grade"
```

**output:**



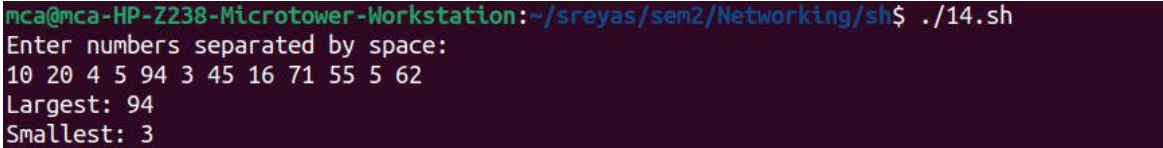
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./13.sh  
Enter student name:  
sreyas  
Enter student's mark:  
90  
Student Name: sreyas  
Student mark: 90  
Student Grade: A
```

14) Write a Shell program to find the smallest and largest numbers from a set of numbers.

**program:**

```
echo "Enter numbers separated by space:"
read -a numbers
largest=${numbers[0]}
smallest=${numbers[0]}
for num in "${numbers[@]"; do
    if [ $num -gt $largest ]; then
        largest=$num
    fi
    if [ $num -lt $smallest ]; then
        smallest=$num
    fi
done
echo "Largest: $largest"
echo "Smallest: $smallest"
```

**output:**



```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./14.sh
Enter numbers separated by space:
10 20 4 5 94 3 45 16 71 55 5 62
Largest: 94
Smallest: 3
```

15) Write a Shell program to find the smallest digit from a number.

**program:**

```
echo "Enter a number:"  
read num  
smallest=$(echo $num | grep -o "[0-9]" | sort | head -n1)  
echo "Smallest digit: $smallest"
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user has entered './15.sh'. The script outputs 'Enter a number:', followed by the user input '2549671', and finally 'Smallest digit: 1'.

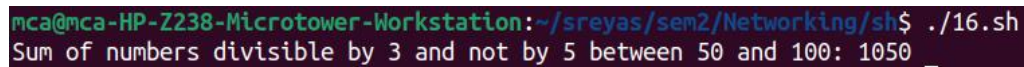
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./15.sh  
Enter a number:  
2549671  
Smallest digit: 1
```

16) Write a Shell program to find the sum of all numbers between 50 and 100, which are divisible by 3 and not divisible by 5.

**program:**

```
sum=0
for ((i=50; i<=100; i++)); do
    if [ $((i % 3)) -eq 0 ] && [ $((i % 5)) -ne 0 ]; then
        sum=$((sum + i))
    fi
done
echo "Sum of numbers divisible by 3 and not by 5 between 50 and 100: $sum"
```

**output:**

A terminal window screenshot with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The command './16.sh' has been entered and executed. The output is 'Sum of numbers divisible by 3 and not by 5 between 50 and 100: 1050'.

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./16.sh
Sum of numbers divisible by 3 and not by 5 between 50 and 100: 1050
```



17) Write a Shell program to find the second highest number from a set of numbers.

**program:**

```
echo "Enter numbers separated by space:"
read -a numbers
IFS=$'\n' sorted=$(sort -n <<<"${numbers[*]}")
len=${#sorted[@]}
echo "Second highest number: ${sorted[len-2]}"
```

**output:**

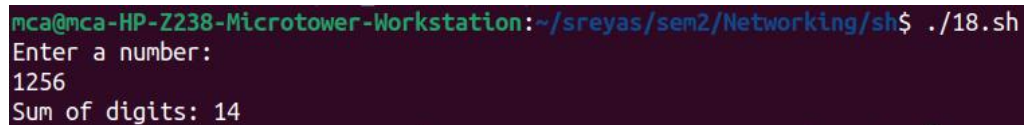
```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./17.sh
Enter numbers separated by space:
10 12 96 41 20 30 14 11 33
Second highest number: 41
```

18) Write a Shell program to find the sum of digits of a number using function.

**program:**

```
echo "Enter a number:"
read num
sum_digits() {
    local n=$1
    local sum=0
    while [ $n -gt 0 ]; do
        sum=$((sum + n % 10))
        n=$((n / 10))
    done
    echo $sum
}
echo "Sum of digits: $(sum_digits $num)"
```

**output:**

A terminal window with a dark background. The prompt is 'mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh\$'. The user enters './18.sh'. The script outputs 'Enter a number:', the user enters '1256', and the script outputs 'Sum of digits: 14'.

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./18.sh
Enter a number:
1256
Sum of digits: 14
```

19) Write a Shell program to print the reverse of a number using function.

**program:**

```
echo "Enter a number:"
read num
reverse() {
    local n=$1
    local rev=0
    while [ $n -gt 0 ]; do
        remainder=$((n % 10))
        rev=$((rev * 10 + remainder))
        n=$((n / 10))
    done
    echo $rev
}
echo "Reverse of $num is: $(reverse $num)"
```

**output:**



```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./19.sh
Enter a number:
2546
Reverse of 2546 is: 6452
```

20) Write a Shell program to find the factorial of a number using for loop.

**program:**

```
echo "Enter a number:"
read num
fact=1
for ((i=1; i<=num; i++)); do
    fact=$((fact * i))
done
echo "Factorial of $num is: $fact"
```

**output:**

```
mca@mca-HP-Z238-Microtower-Workstation:~/sreyas/sem2/Networking/sh$ ./20.sh
Enter a number:
5
Factorial of 5 is: 120
```

21) Write a Shell program to generate Fibonacci series.

**program:**

```
echo "Enter the number of terms:"
read n
a=0
b=1
echo "Fibonacci Series:"
for ((i=0; i<n; i++)); do
    echo -n "$a "
    fn=$((a + b))
    a=$b
    b=$fn
done
```

**output:**

22) Write a shell script, which receives two filenames as arguments. It checks whether the two files contents are same or not. If they are same then second file is deleted.

**program:**

```
if [ $# -ne 2 ]; then
    echo "Usage: $0 <file1> <file2>"
    exit 1
fi
if cmp -s "$1" "$2"; then
    echo "Files are the same. Deleting $2"
    rm $2
else
    echo "Files are different"
fi
```

**output:**

23) Write a Menu driven Shell script that Lists current directory, Prints Working Directory, displays Date and displays Users logged in.

**program:**

```
PS3="Select option: "
select opt in "List current directory" "Print working directory" "Display date" "Display
users logged in" "Exit"; do
    case $opt in
        "List current directory")
            ls
            ;;
        "Print working directory")
            pwd
            ;;
        "Display date")
            date
            ;;
        "Display users logged in")
            who
            ;;
        "Exit")
            break
            ;;
        *)
            echo "Invalid option"
            ;;
    esac
done
```

**output:**

24) Shell script to check executable rights for all files in the current directory, if a file does not have the execute permission then make it executable.

**program:**

```
for file in *; do
    if [ -f $file ] && [ ! -x $file ]; then
        chmod +x $file
        echo "$file is made executable"
    fi
done
```

**output:**



25) Write a Shell program to generate all combinations of 1, 2, and 3 using loop.

**program:**

```
for i in 1 2 3; do
  for j in 1 2 3; do
    for k in 1 2 3; do
      echo "$i$j$k"
    done
  done
done
```

**output:**

26) Write a Shell program to create the number series.

**program:**

```
echo "Enter the number of terms:"  
read n  
echo "Number series:"  
for ((i=1; i<=n; i++)); do  
    echo -n "$i "  
done
```

**output:**

27) Write a Shell program to create Pascal's triangle.

**program:**

```
echo "Enter the number of rows:"
read rows
for ((i=0; i<rows; i++)); do
    for ((j=0; j<=i; j++)); do
        if [ $j -eq 0 ] || [ $i -eq $j ]; then
            coef=1
        else
            num=$((i-j+1))
            den=$j
            coef=$((coef * num / den))
        fi
        echo -n "$coef "
    done
    echo
done
```

**output:**

28) Write a Decimal to Binary Conversion Shell Script.

**program:**

```
echo "Enter a decimal number:"  
read decimal  
echo "Binary conversion: $(echo "obase=2; $decimal" | bc)"
```

**output:**

29) Write a Shell Script to Check Whether a String is Palindrome or not.

**program:**

```
echo "Enter a string:"
read str
reverse=$(echo $str | rev)
if [ "$str" = "$reverse" ]; then
    echo "$str is a palindrome"
else
    echo "$str is not a palindrome"
fi
```

**output:**

30) Write a shell script to find out the unique words in a file and also count the occurrence of each of these words.

**program:**

```
echo "Enter file name:"  
read filename  
awk '{for(i=1;i<=NF;i++) a[$i]++} END {for(k in a) print k, a[k]}' $filename
```

**output:**

31) Write a shell script to get the total count of the word "Linux" in all the ".txt" files and also across files present in subdirectories.

**program:**

```
echo "Enter directory path:"  
read dir  
grep -roh "Linux" $dir | wc -w
```

**output:**

32) Write a shell script to validate password strength. Here are a few assumptions for the password string. ( Length – minimum of 8 characters. Contain both alphabet and number. Include both the small and capital case letters.)

**program:**

```
echo "Enter password:"
read password
if [[ ${#password} -lt 8 ]]; then
    echo "Password length should be at least 8 characters"
    exit 1
fi
if ! [[ $password =~ [0-9] ]]; then
    echo "Password should contain at least one digit"
    exit 1
fi
if ! [[ $password =~ [A-Z] ]]; then
    echo "Password should contain at least one uppercase letter"
    exit 1
fi
if ! [[ $password =~ [a-z] ]]; then
    echo "Password should contain at least one lowercase letter"
    exit 1
fi
echo "Password is strong"
```

**output:**



33) Write a shell script to print the count of files and subdirectories in the specified directory.

**program:**

```
echo "Enter directory path:"  
read dir  
echo "Number of files and subdirectories: $(find $dir -type d -or -type f | wc -l)"
```

**output:**

34) Write a shell script to reverse the list of strings and reverse each string further in the list.

**program:**

```
echo "Enter strings separated by space:"
read -a strings
for ((i=0; i<${#strings[@]}; i++)); do
    rev=$(echo ${strings[i]} | rev)
    reversed_strings[$i]=$rev
done
echo "Reversed list of strings:"
for string in "${reversed_strings[@]}"; do
    echo "$(echo $string | rev)"
done
```

**output:**