

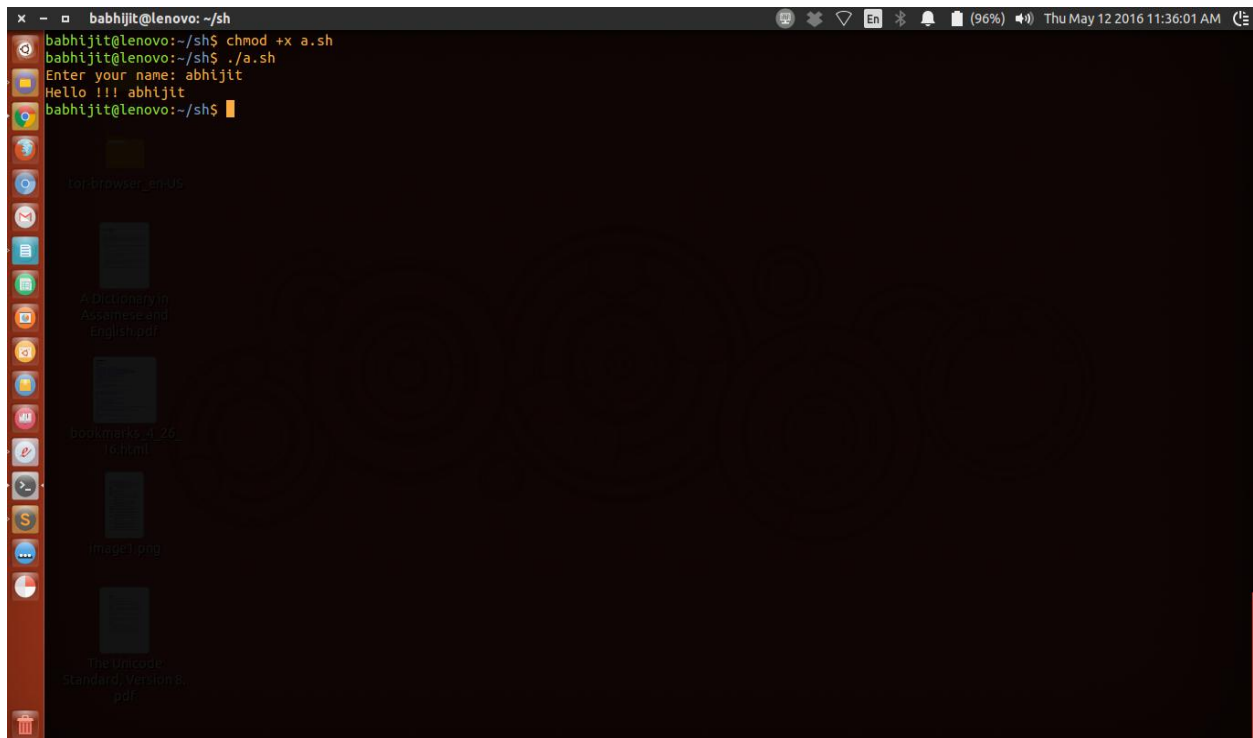
## Shell Programming Lab

P1:- Write a shell program to read a string and display it.

Program:-

```
#!/bin/bash  
  
echo -n "Enter your name: ";  
  
read var;  
  
echo "Hello !!! $var";
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has executed the following commands and received the corresponding output:

```
babhijit@lenovo:~/sh$ chmod +x a.sh  
babhijit@lenovo:~/sh$ ./a.sh  
Enter your name: abhijit  
Hello !!! abhijit  
babhijit@lenovo:~/sh$
```

The terminal window also displays a sidebar with various application icons and a desktop background featuring a large 'A' logo.

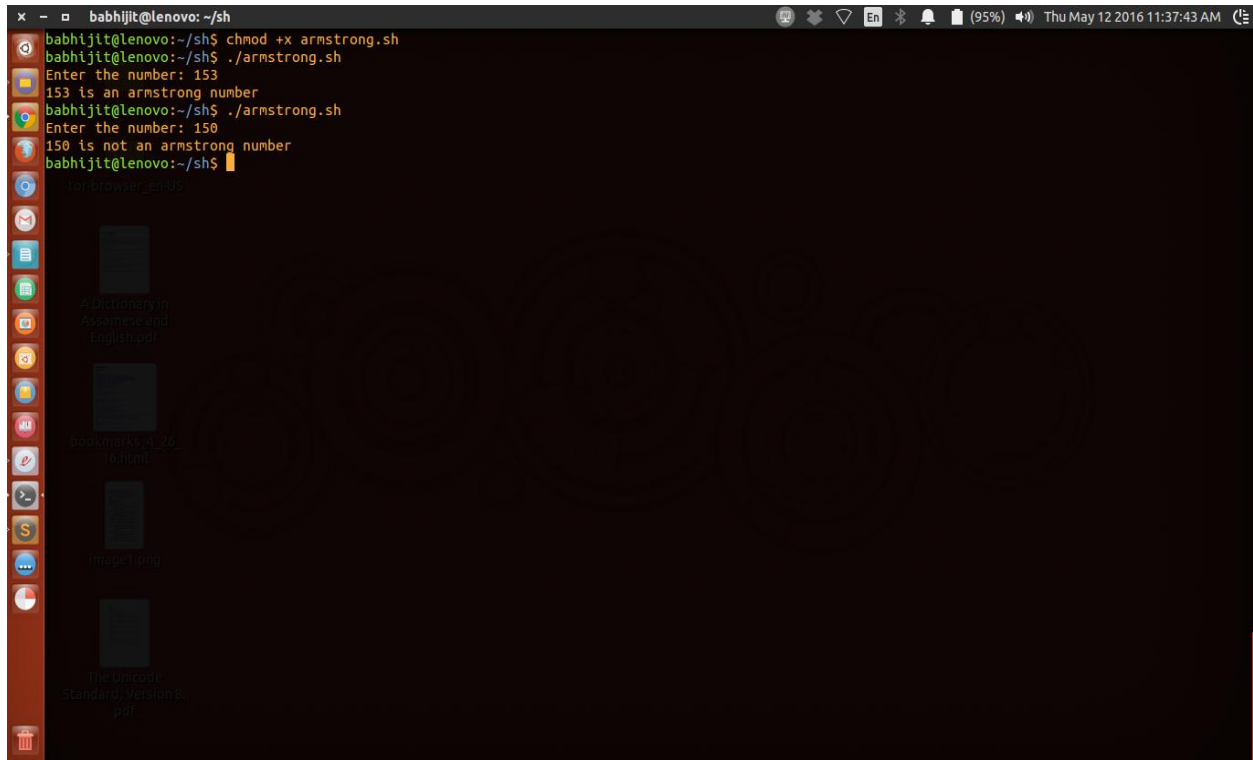
P2:- Write a shell program to check whether a number is armstrong or not.

Program:-

```
#!/bin/sh
echo -n "Enter the number: ";
read num;
q=$num;
res=0;
while [ "$q" -ne 0 ]
do
    re=$(( $q % 10 ));
    cube=$(( $re * $re * $re ));
    res=$(( $cube + $res ));
    q=$(( $q / 10 ));
done
if [ "$res" -eq "$num" ]
then
    echo "$num is an armstrong number";
else
    echo "$num is not an armstrong number";
fi
```

## Output:-

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x armstrong.sh
babhijit@lenovo:~/sh$ ./armstrong.sh
Enter the number: 153
153 is an armstrong number
babhijit@lenovo:~/sh$ ./armstrong.sh
Enter the number: 150
150 is not an armstrong number
babhijit@lenovo:~/sh$
```

The image shows a Linux desktop environment with a dark theme. A terminal window is open, displaying the execution of a script named 'armstrong.sh'. The user 'babhijit' is logged in on a machine named 'lenovo'. The terminal shows the user making the script executable with 'chmod +x armstrong.sh' and then running it twice. The first run with input '153' outputs '153 is an armstrong number', and the second run with input '150' outputs '150 is not an armstrong number'. The desktop background is dark with a faint circular pattern. On the left side, there is a vertical dock with various application icons. Several PDF files are visible on the desktop, including 'A Dictionary in Assamese and English.pdf', 'Bachchan Me 1298 B.M.M.pdf', 'image1.png', and 'The Unicode Standard, Version 8.pdf'.

P3:- Write a shell program for a simple calculator.

Program:-

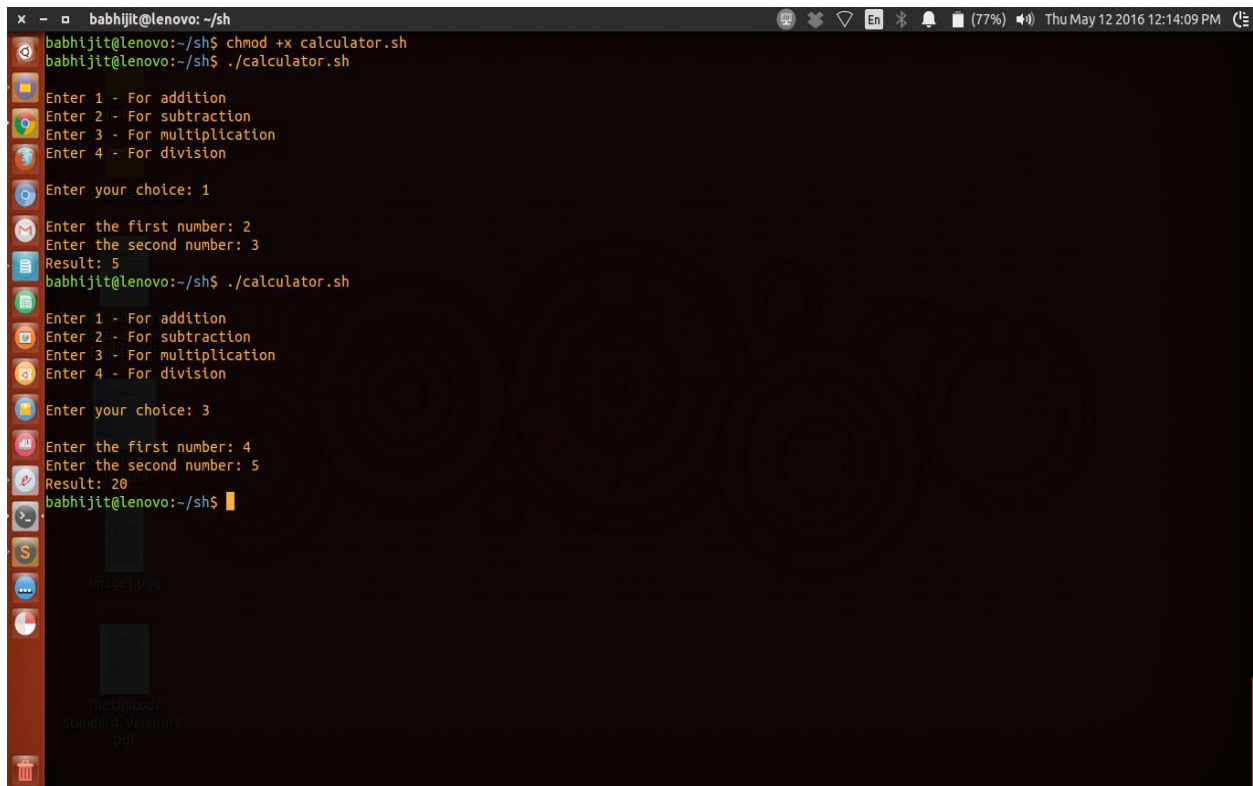
```
#!/bin/sh

echo "\nEnter 1 - For addition";
echo "Enter 2 - For subtraction";
echo "Enter 3 - For multiplication";
echo "Enter 4 - For division";
echo -n "\nEnter your choice: ";
read n;
echo -n "\nEnter the first number: ";
read num1;
echo -n "Enter the second number: ";
read num2;
case "$n" in
    "1") #echo "Result: $((($num1+$num2)) ";
        echo -n "Result: "; awk "BEGIN {print $num1+$num2;exit}";
        ;;
    "2") #echo "Result: $((($num1-$num2))";
        echo -n "Result: "; awk "BEGIN {print $num1-$num2;exit}";
        ;;
    "3") #echo "Result: $((($num1*$num2))";
        echo -n "Result: "; awk "BEGIN {print $num1*$num2;exit}";
        ;;
```

[5]

```
"4") #echo "Result: $((($num1/$num2))";  
      echo -n "Result: "; awk "BEGIN {print  
$num1/$num2;exit}";  
      ;;  
esac
```

Output:-



```
babhi@lenovo:~/sh$ chmod +x calculator.sh  
babhi@lenovo:~/sh$ ./calculator.sh  
Enter 1 - For addition  
Enter 2 - For subtraction  
Enter 3 - For multiplication  
Enter 4 - For division  
Enter your choice: 1  
Enter the first number: 2  
Enter the second number: 3  
Result: 5  
babhi@lenovo:~/sh$ ./calculator.sh  
Enter 1 - For addition  
Enter 2 - For subtraction  
Enter 3 - For multiplication  
Enter 4 - For division  
Enter your choice: 3  
Enter the first number: 4  
Enter the second number: 5  
Result: 20  
babhi@lenovo:~/sh$
```

P4:- Write a shell program to display various date and time formats.

Program:-

```
#!/bin/sh

echo "Present date and time in various formats";

echo -n "\n(1) ";

date

echo -n "\n(2) ";

date +%d/%m/%Y

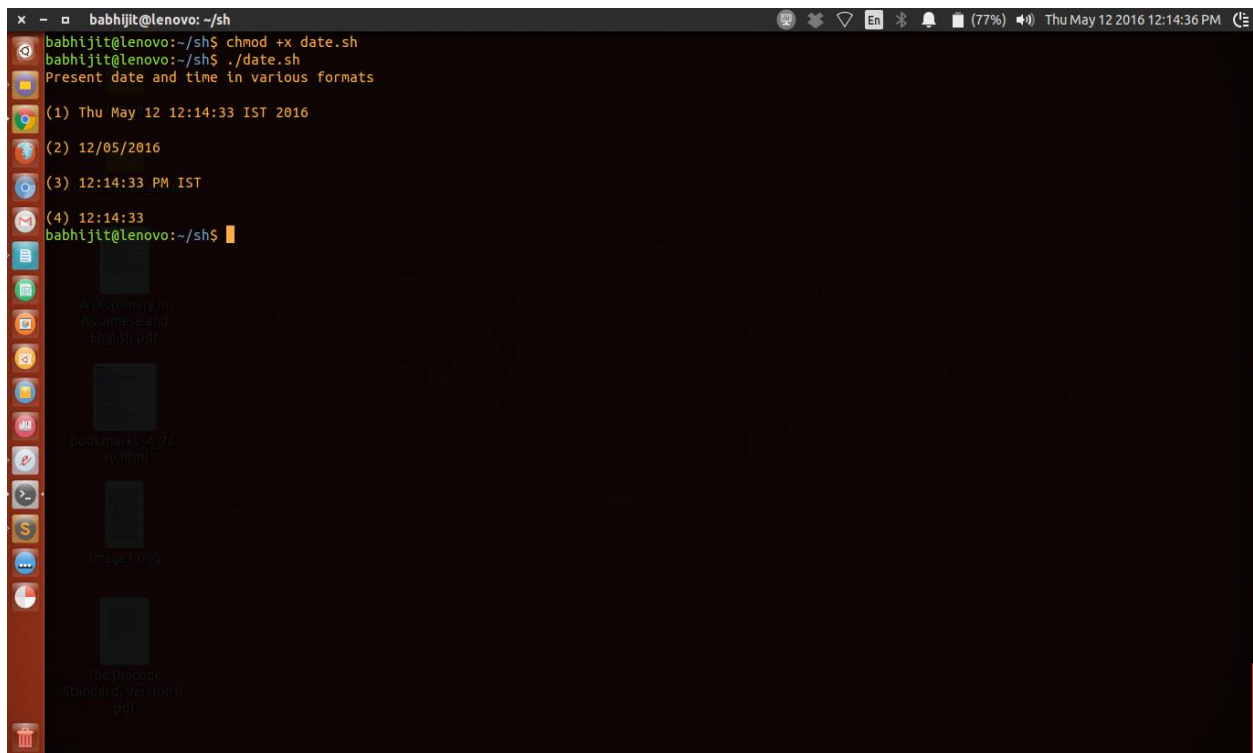
echo -n "\n(3) ";

date +%r

echo -n "\n(4) ";

date +%I:%M:%S'
```

Output:-



```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x date.sh
babhijit@lenovo:~/sh$ ./date.sh
Present date and time in various formats

(1) Thu May 12 12:14:33 IST 2016

(2) 12/05/2016

(3) 12:14:33 PM IST

(4) 12:14:33
babhijit@lenovo:~/sh$
```

P5:- Write a shell program to check whether a number is even or not.

Program:-

```
#!/bin/sh

echo -n "Enter the number: "

read var

#r=$(( $var%2 ))

if [ "$r" -eq 0 ]

then

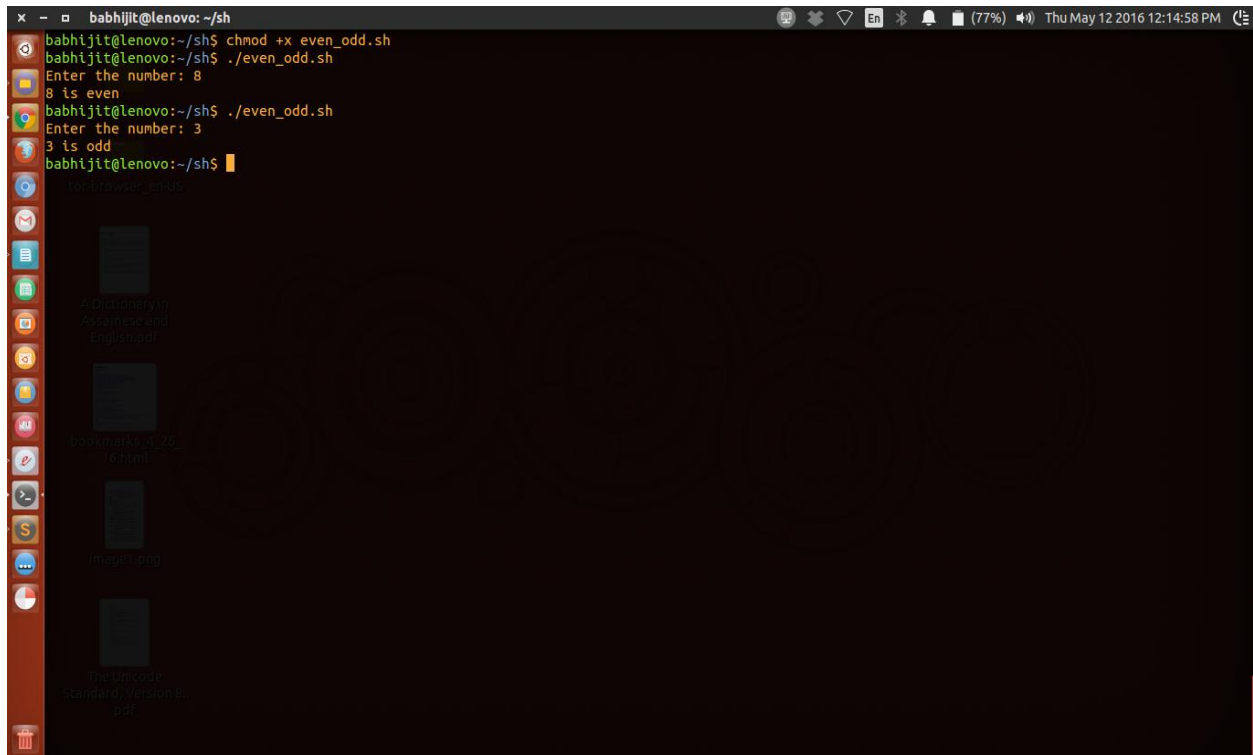
    echo "$var is even";

else

    echo "$var is odd";

fi
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has created a script named 'even\_odd.sh' and made it executable with 'chmod +x even\_odd.sh'. They then run the script './even\_odd.sh'. The script prompts 'Enter the number:'. In the first run, the user enters '8', and the script outputs '8 is even'. In the second run, the user enters '3', and the script outputs '3 is odd'. The terminal window also shows a sidebar with icons for various applications and a taskbar at the bottom.

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x even_odd.sh
babhijit@lenovo:~/sh$ ./even_odd.sh
Enter the number: 8
8 is even
babhijit@lenovo:~/sh$ ./even_odd.sh
Enter the number: 3
3 is odd
babhijit@lenovo:~/sh$
```

P6:- Write a shell program to find the factorial of a number.

Program:-

```
#!/bin/sh

echo -n "Enter the number: "

read n

fact=1;

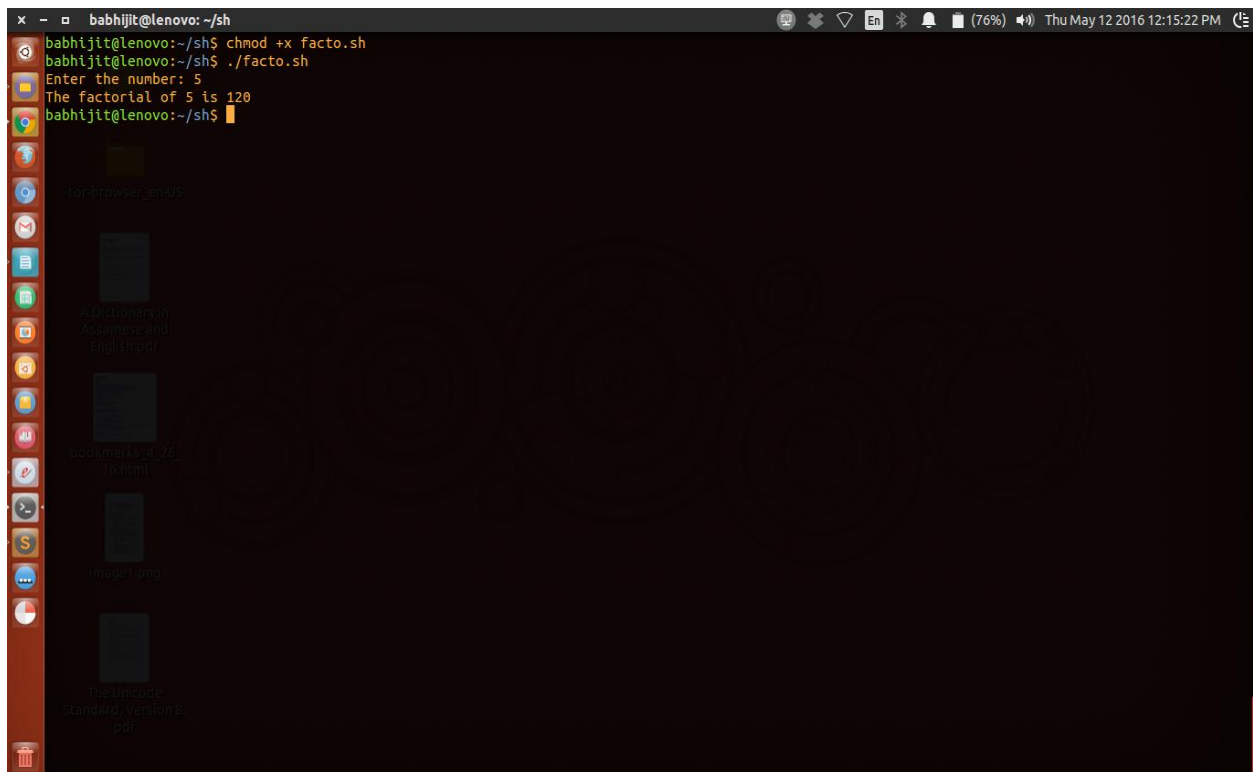
for i in $(bash -c "echo {2..${n}}")
do

    fact=$(( $fact * $i ));

done

echo "The factorial of $n is $fact";
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has executed the following commands: `chmod +x facto.sh` and `./facto.sh`. The script prompts 'Enter the number: 5' and outputs 'The factorial of 5 is 120'. The terminal window has a dark background and a sidebar on the left with various application icons. The top status bar shows the date and time as 'Thu May 12 2016 12:15:22 PM' and the battery level as '(76%)'.



P7:- Write a shell program to find the greatest of 2 numbers.

Program:-

```
#!/bin/sh

echo -n "Enter the first number: ";

read a;

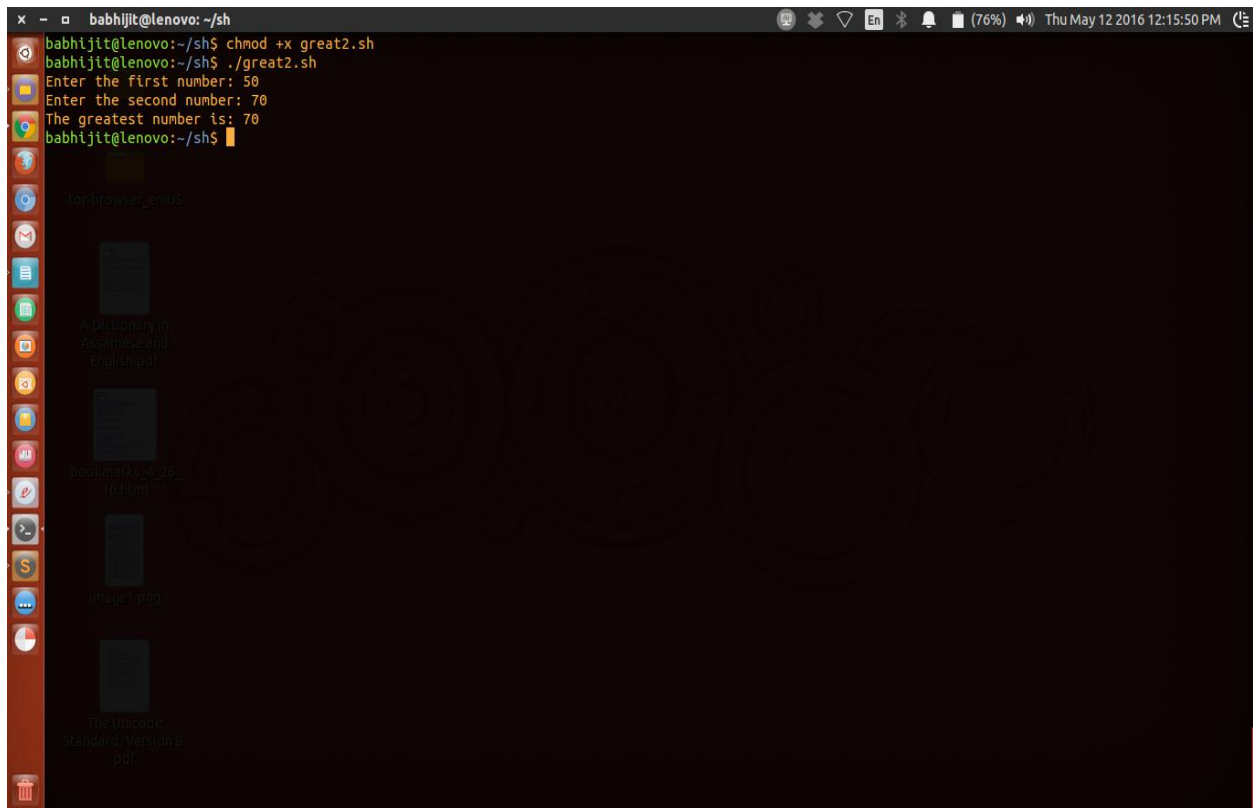
echo -n "Enter the second number: ";

read b;

grt=$( [ "$a" -gt "$b" ] && echo "$a" || echo "$b");

echo "The greatest number is: $grt";
```

Output:-

A screenshot of a Linux terminal window. The window title is "babhijit@lenovo: ~/sh". The terminal shows the following commands and output:

```
babhijit@lenovo:~/sh$ chmod +x great2.sh
babhijit@lenovo:~/sh$ ./great2.sh
Enter the first number: 50
Enter the second number: 70
The greatest number is: 70
babhijit@lenovo:~/sh$
```

The terminal background is black with white text. On the left side, there is a vertical dock with various application icons. The top of the window shows system status icons including network, battery (76%), and time (Thu May 12 2016 12:15:50 PM).

```

babhiijt@lenovo: ~/sh
babhiijt@lenovo:~/sh$ chmod +x great3.sh
babhiijt@lenovo:~/sh$ ./great3.sh
Enter the first number: 40
Enter the second number: 70
Enter the third number: 50
The greatest number is: 70
babhiijt@lenovo:~/sh$

```

P9:- Write a shell program to generate the following pattern –

```

1
1  2
1  2  3
1  2  3  4
1  2  3  4  5

```

Program:-

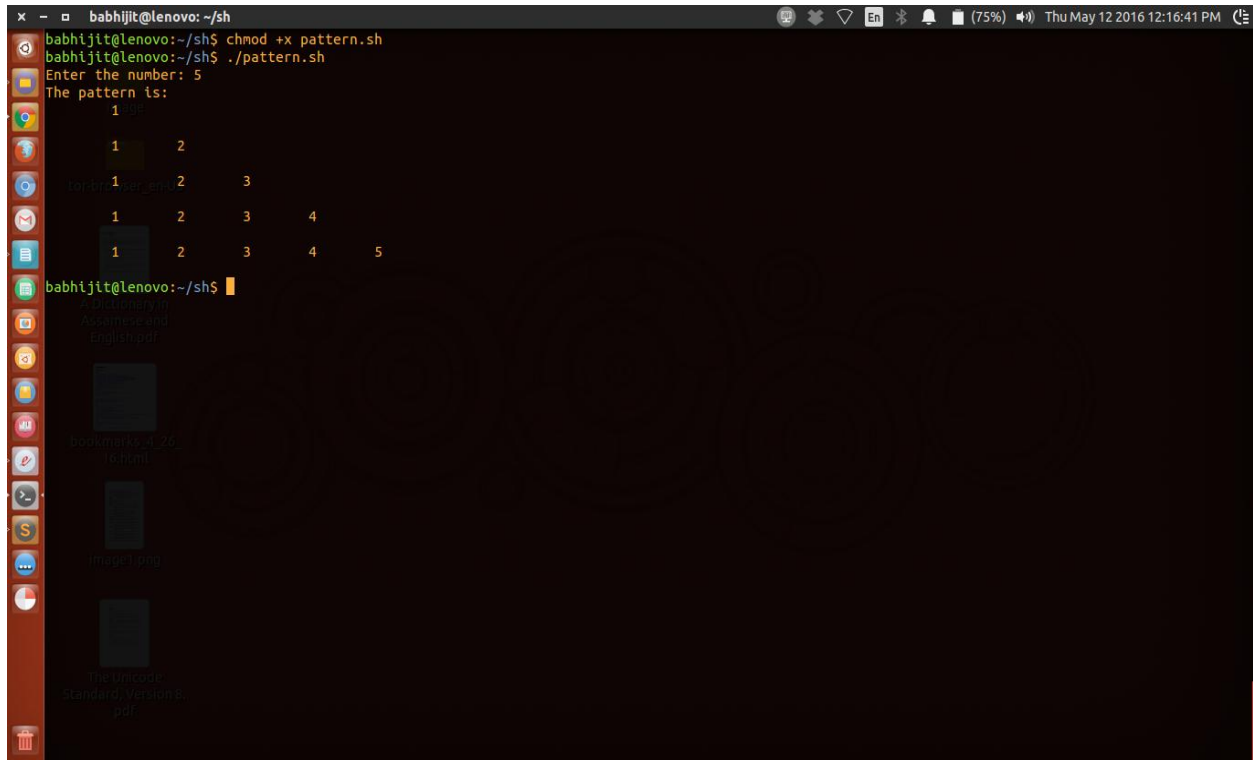
```

#!/bin/sh
echo -n "Enter the number: ";
read n;
echo "The pattern is: ";
for i in $(bash -c "echo {1..${n}}")
do
    for j in $(bash -c "echo {1..${i}}")
    do
        echo -n "\t$j";
    done
    echo "\n";
done

```

Output:-

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x pattern.sh
babhijit@lenovo:~/sh$ ./pattern.sh
Enter the number: 5
The pattern is:
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
babhijit@lenovo:~/sh$
```



P10:- Write a shell program to generate the following pattern.

```

J
J  O
J  O  R
J  O  R  H
J  O  R  H  A
J  O  R  H  A  T

```

Program:-

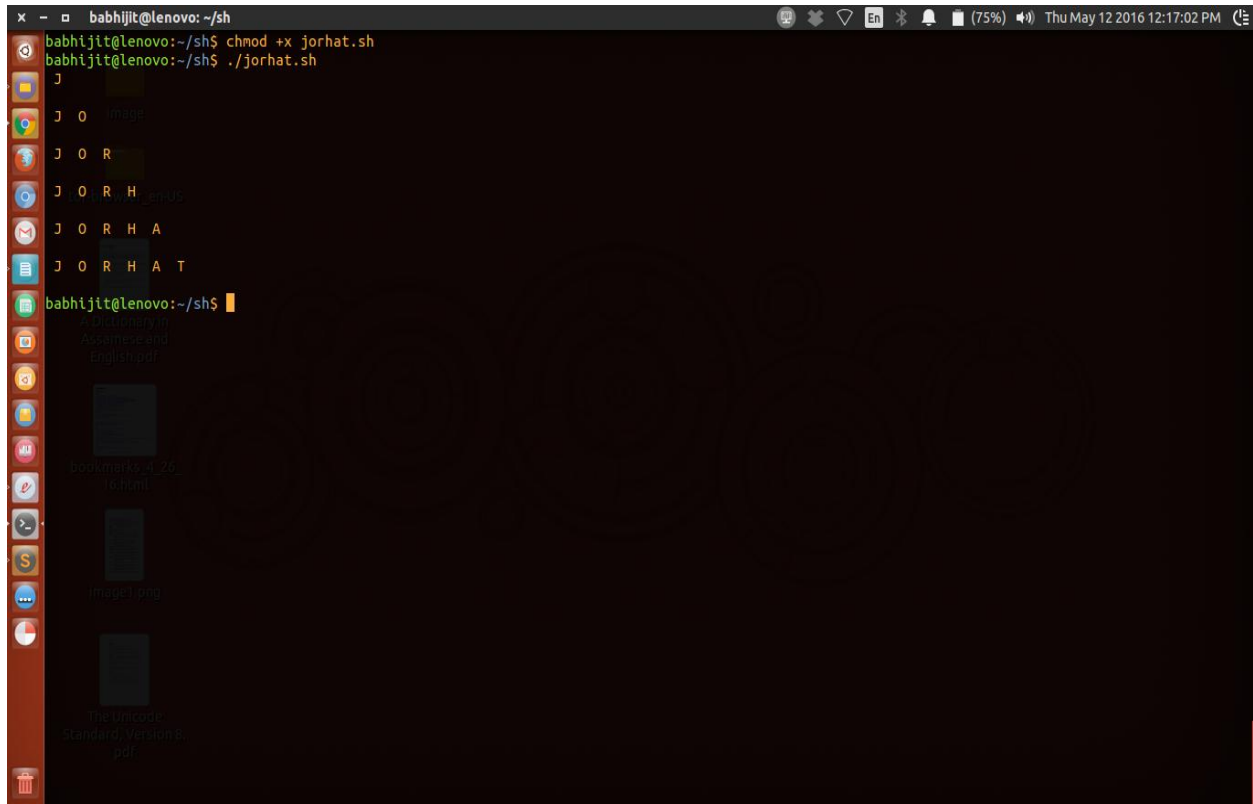
```

#!/bin/bash
#ar[0]="J";
#ar[1]="O";
#ar[2]="R";
#ar[3]="H";
#ar[4]="A";
#ar[5]="T";
ar=("J" "O" "R" "H" "A" "T");
for i in $(bash -c "echo {0..5}")
do
    for j in $(bash -c "echo {0..${i}}")
    do
        echo -n "${ar[$j]} ";
        #awk "BEGIN {print $j;exit}";
    done
    echo -e "\n";
done

```

## Output:-

```
x - babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x jorhat.sh
babhijit@lenovo:~/sh$ ./jorhat.sh
J
J O
J O R
J O R H
J O R H A
J O R H A T
babhijit@lenovo:~/sh$
```



P11:- Write a shell program to check whether a year is leap year or not.

Program:-

```
#!/bin/sh

echo -n "Enter the year: ";

read num;

if [ $((($num%4)) -eq 0 ]

then

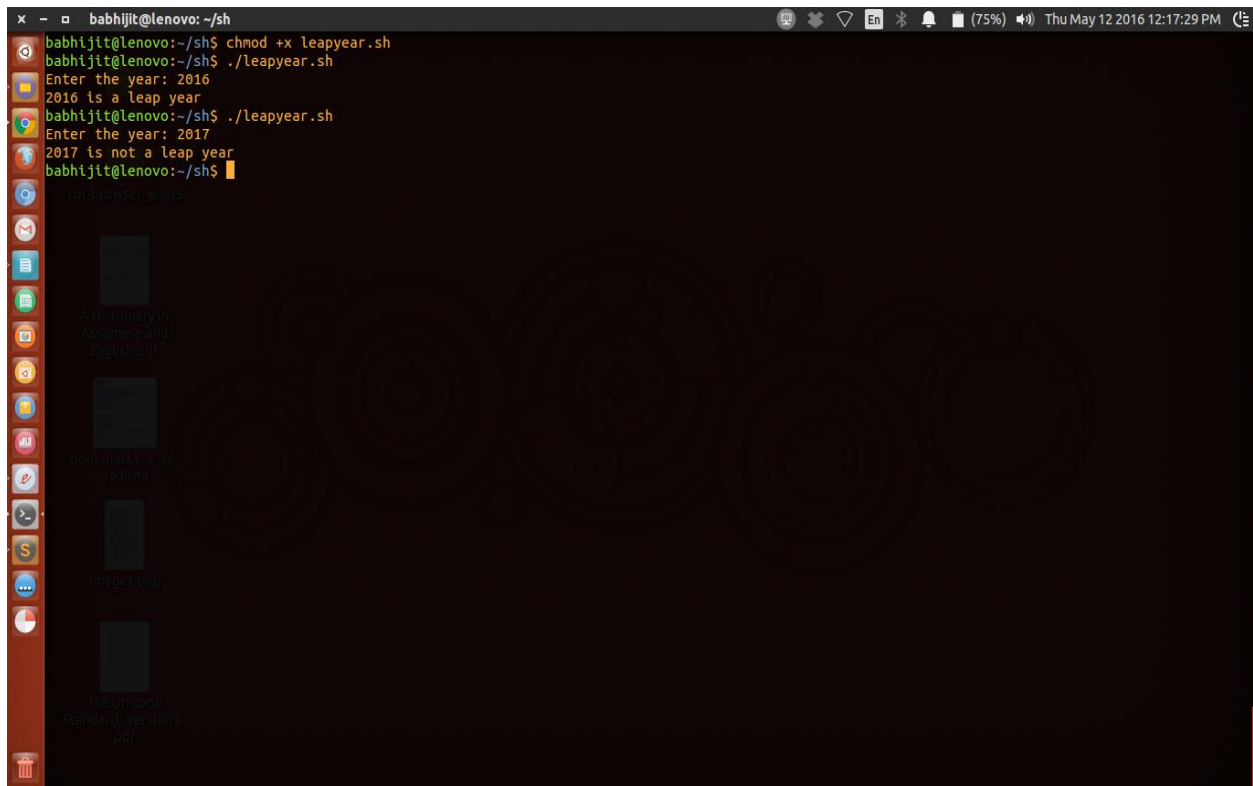
    echo "$num is a leap year";

else

    echo "$num is not a leap year";

fi
```

Output:-

A screenshot of a Linux terminal window. The window title is 'babhijit@lenovo: ~/sh'. The terminal shows the following commands and output:  
1. `babhijit@lenovo:~/sh$ chmod +x leapyear.sh`  
2. `babhijit@lenovo:~/sh$ ./leapyear.sh`  
 Output: `Enter the year: 2016`  
 Output: `2016 is a leap year`  
3. `babhijit@lenovo:~/sh$ ./leapyear.sh`  
 Output: `Enter the year: 2017`  
 Output: `2017 is not a leap year`  
4. `babhijit@lenovo:~/sh$`  
The terminal background is black with white text. On the left side, there is a vertical dock with various application icons. The desktop background is dark with several PDF files visible: 'A Dictionary in Assamese and English.pdf', 'bookmarks (1).pdf', 'image1.png', and 'The Unicode Standard, Version 8.0.pdf'.

P12:- Write a shell program to find the sum of first 'n' natural numbers.

Program:-

```
#!/bin/sh

echo -n "Enter the natural number: ";

read var;

count=0;

sumn=0;

while [ "$var" -ge "$count" ]
do

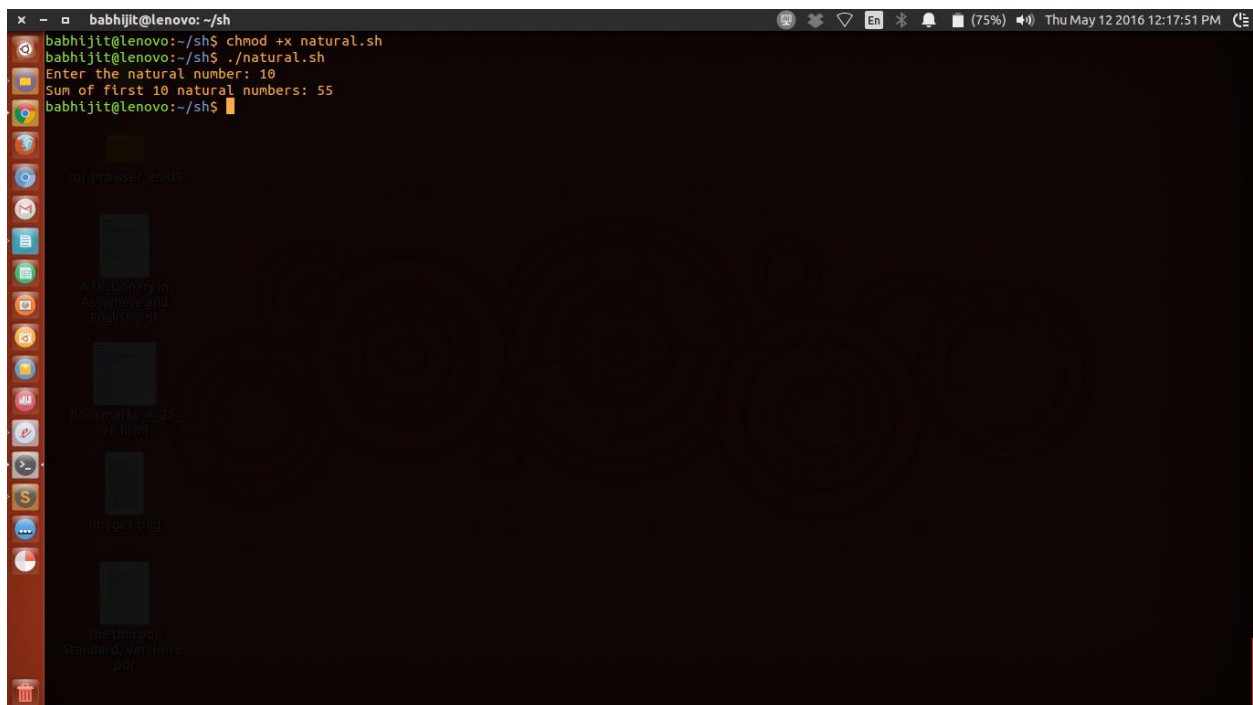
    sumn=$((sumn+count));

    count=$((count+1));

done

echo "Sum of first $var natural numbers: $sumn";
```

Output:-



The screenshot shows a terminal window with the following text:

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x natural.sh
babhijit@lenovo:~/sh$ ./natural.sh
Enter the natural number: 10
Sum of first 10 natural numbers: 55
babhijit@lenovo:~/sh$
```

The terminal window has a title bar that reads "babhijit@lenovo: ~/sh". The desktop background is dark, and there is a vertical dock on the left side with various application icons. The system tray at the top right shows the date and time as "Thu May 12 2016 12:17:51 PM" and the battery level as "(75%)".



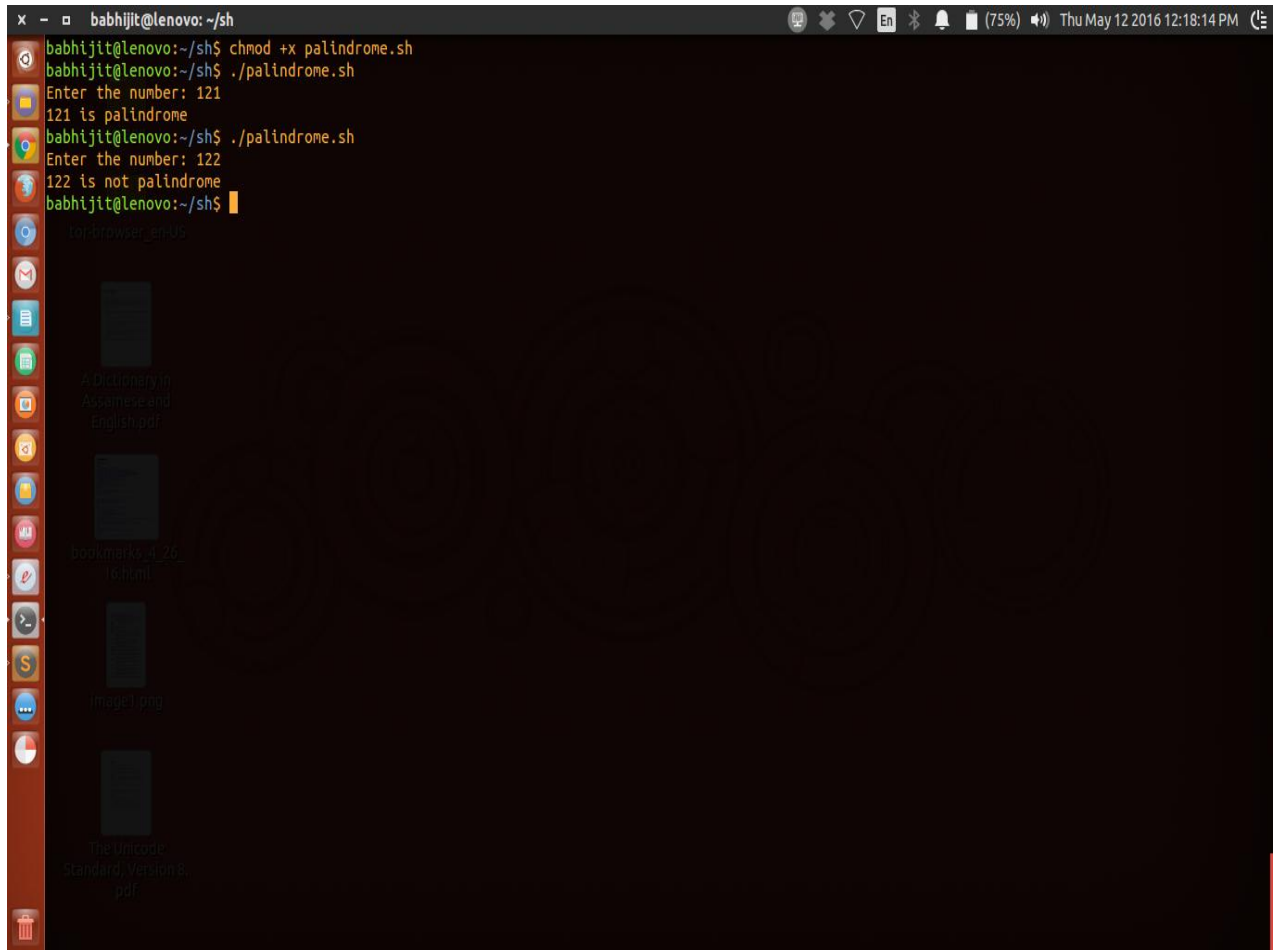
P13:- Write a shell program to check whether a number is palindrome or not.

Program:-

```
#!/bin/sh
echo -n "Enter the number: ";
read n;
m=$n;
res=0;
while [ "$n" -ne 0 ]
do
    re=$(( $n % 10 ));
    res=$(( 10 * $res + re ));
    n=$(( $n / 10 ));
done
if [ "$m" -eq "$res" ]
then
    echo "$m is palindrome";
else
    echo "$m is not palindrome";
fi
```

Output:-

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x palindrome.sh
babhijit@lenovo:~/sh$ ./palindrome.sh
Enter the number: 121
121 is palindrome
babhijit@lenovo:~/sh$ ./palindrome.sh
Enter the number: 122
122 is not palindrome
babhijit@lenovo:~/sh$
```

The image shows a Linux desktop environment. On the left, there is a sidebar with various application icons including a file manager, web browser, email client, and social media apps. Below the icons, several files are listed: 'A Dictionary in Assamese and English.pdf', 'bookmarks\_1\_29\_16.html', 'image1.png', and 'The Unicode standard, Version 6.0.pdf'. The main area of the desktop is dark and mostly empty. At the top, a terminal window is open, displaying the execution of a shell script named 'palindrome.sh'. The terminal shows the user 'babhijit' at the 'lenovo' machine in the directory '~/sh'. The user runs 'chmod +x palindrome.sh' and then './palindrome.sh' twice. The first run prompts for 'Enter the number: 121' and outputs '121 is palindrome'. The second run prompts for 'Enter the number: 122' and outputs '122 is not palindrome'. The terminal window's title bar shows 'babhijit@lenovo: ~/sh'. The system status bar at the top right indicates the date and time as 'Thu May 12 2016 12:18:14 PM' and shows icons for network, battery (75%), and other system utilities.

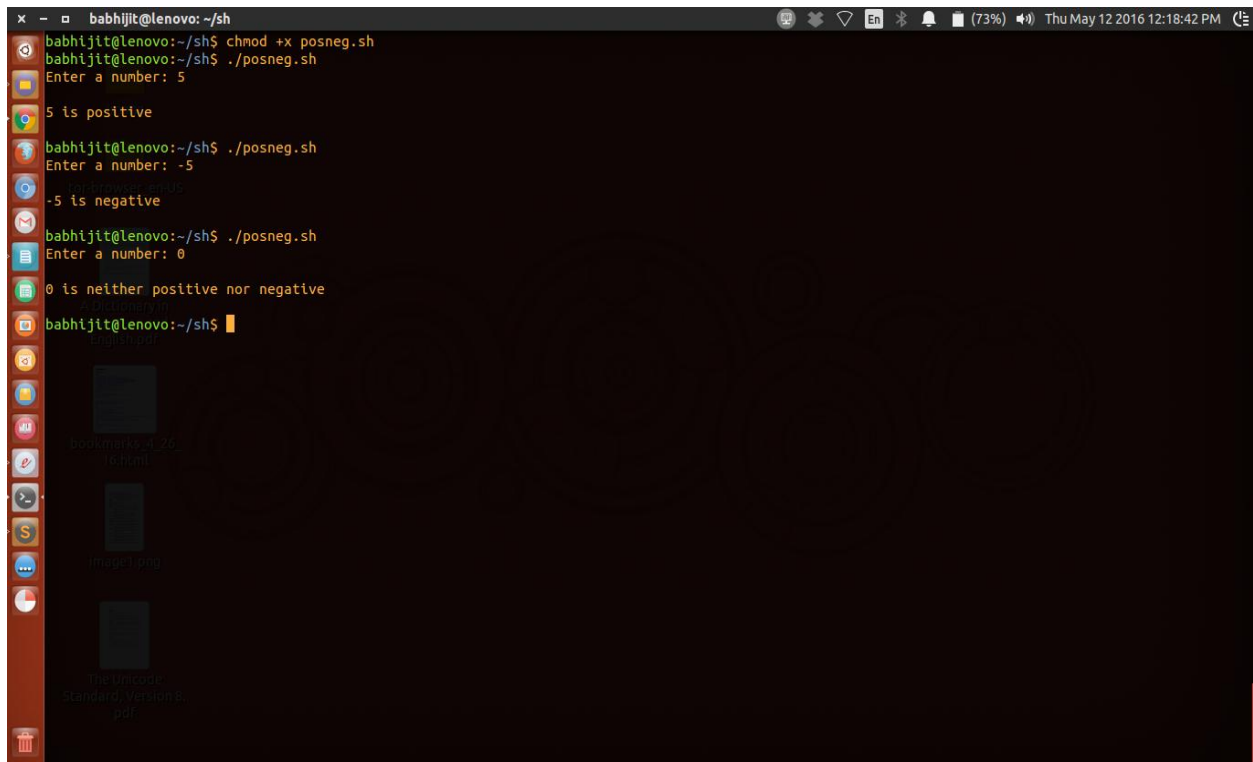
P14:- Write a shell program to check whether a number is positive or negative.

Program:-

```
#!/bin/sh
echo -n "Enter a number: ";
read num;
if [ "$num" -gt 0 ]
then
    echo "\n$num is positive\n";
fi
if [ "$num" -lt 0 ]
then
    echo "\n$num is negative\n";
fi
if [ "$num" -eq 0 ]
then
    echo "\n$num is neither positive nor negative\n";
fi
```

## Output:-

```
x - babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x posneg.sh
babhijit@lenovo:~/sh$ ./posneg.sh
Enter a number: 5
5 is positive
babhijit@lenovo:~/sh$ ./posneg.sh
Enter a number: -5
-5 is negative
babhijit@lenovo:~/sh$ ./posneg.sh
Enter a number: 0
0 is neither positive nor negative
babhijit@lenovo:~/sh$
```



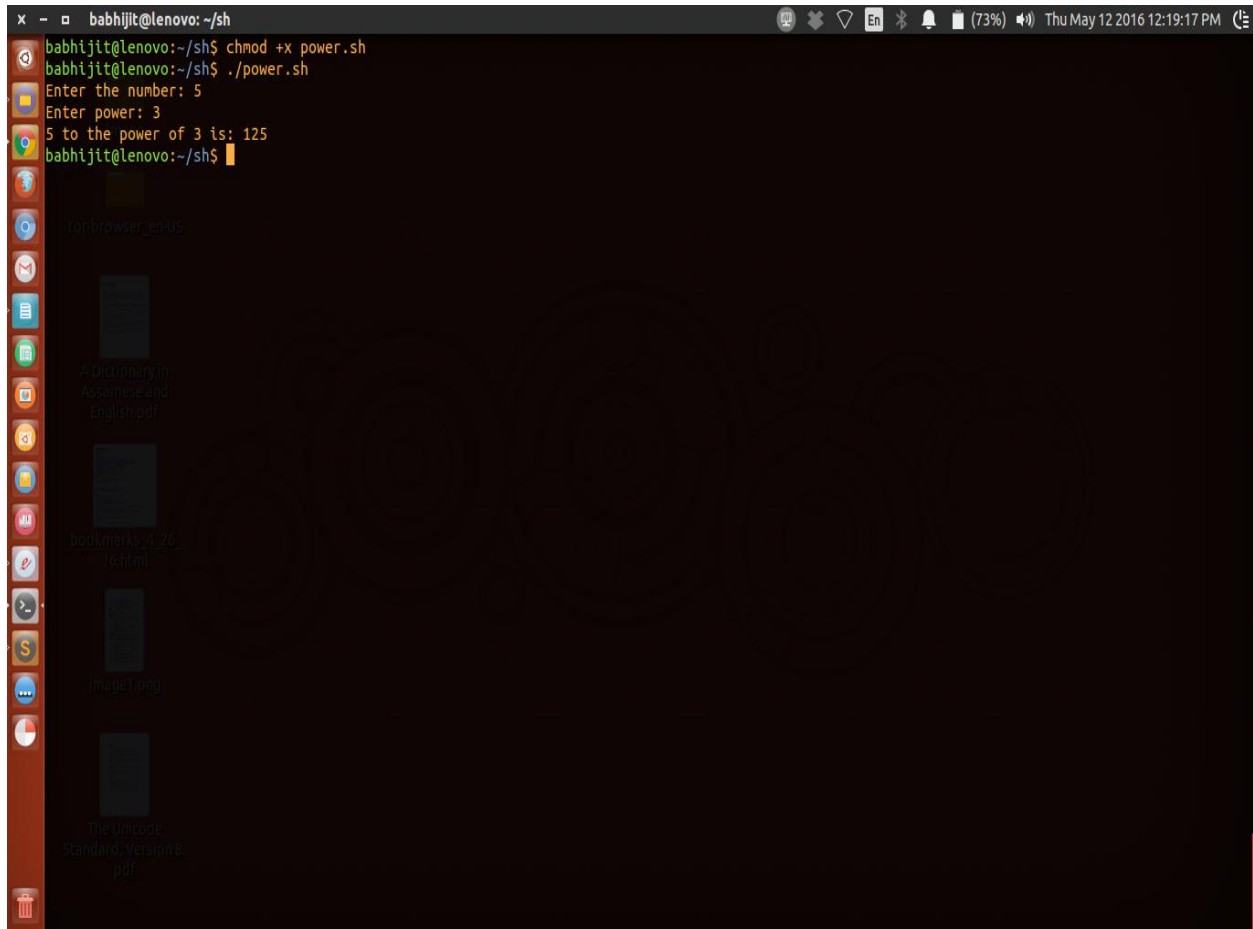
P15:- Write a shell program to find the power of a number ( $x^y$ ).

Program:-

```
#!/bin/sh
echo -n "Enter the number: ";
read x;
echo -n "Enter power: ";
read y;
res=1;
if [ "$y" -eq 0 ]
then
    res=1;
else
for i in $(bash -c "echo {1..${y}}")
do
    res=$(( $res * $x ));
done
fi
#res=$(( $a * $a * $a ));
echo "$x to the power of $y is: $res";
```

## Output:-

```
babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x power.sh
babhijit@lenovo:~/sh$ ./power.sh
Enter the number: 5
Enter power: 3
5 to the power of 3 is: 125
babhijit@lenovo:~/sh$
```



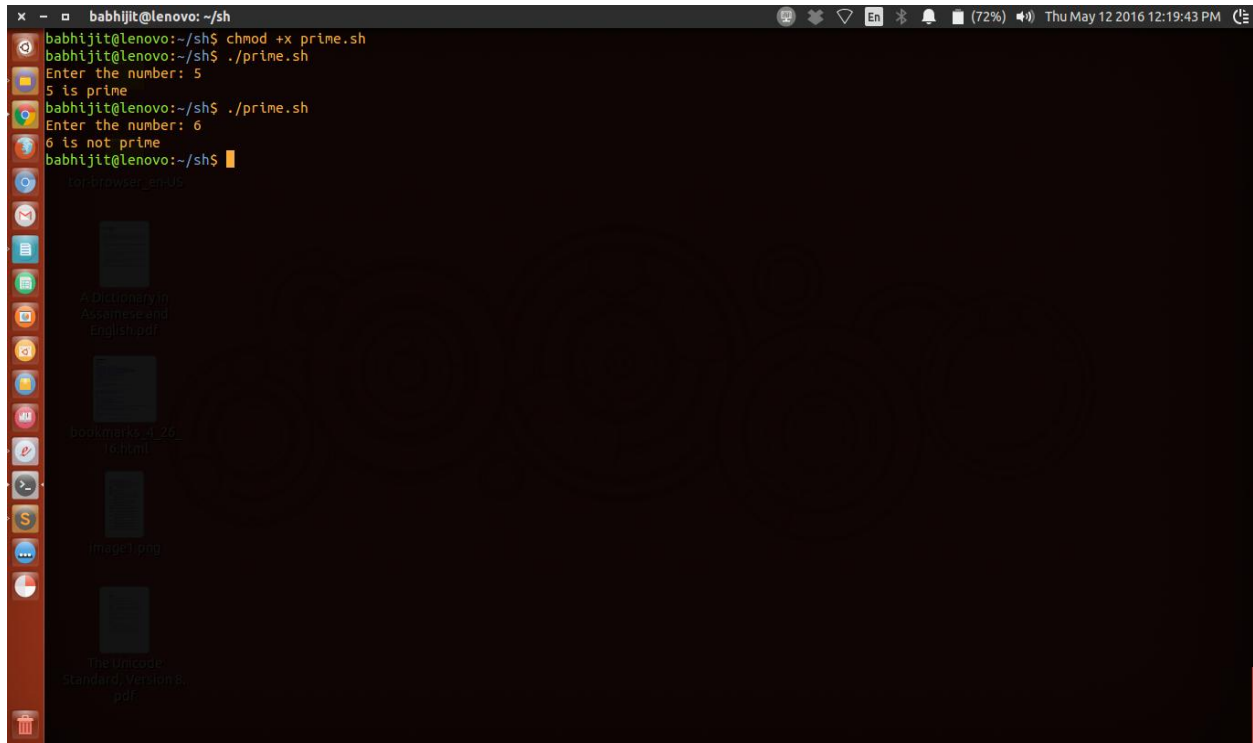
P16:- Write a shell program to check whether a number is prime or not.

Program:-

```
#!/bin/sh
echo -n "Enter the number: ";
read n
for i in $(bash -c "echo {2..${n}}")
do
    #echo "$i"
    if [ "$(($n%i))" -eq 0 ]
    then
        break;
    fi
done
if [ "$n" -eq "$i" ]
then
    echo "$n is prime";
else
    echo "$n is not prime";
fi
```

## Output:-

```
x - babhijit@lenovo: ~/sh
babhijit@lenovo:~/sh$ chmod +x prime.sh
babhijit@lenovo:~/sh$ ./prime.sh
Enter the number: 5
5 is prime
babhijit@lenovo:~/sh$ ./prime.sh
Enter the number: 6
6 is not prime
babhijit@lenovo:~/sh$
```

A screenshot of a Linux desktop environment. On the left, there is a vertical dock with various application icons including a terminal, file manager, and web browser. The main area of the desktop is dark. In the foreground, a terminal window is open, showing the execution of a script named 'prime.sh'. The script prompts the user to enter a number. The first run with input '5' results in the output '5 is prime'. The second run with input '6' results in the output '6 is not prime'. The terminal window title is 'babhijit@lenovo: ~/sh'. In the background, a file manager window is visible, showing a directory with several PDF files, including 'A History of the Assamese and English.pdf', 'bookmarks-1.2.0.pdf', 'image1.png', and 'The Unicode Standard, Version 8.0.pdf'.



P17:- Write a shell program to reverse a number.

Program:-

```
#!/bin/sh

echo -n "Enter the number: ";

read n;

m=$n;

res=0;

while [ "$n" -ne 0 ]

do

    re=$(( $n % 10 ));

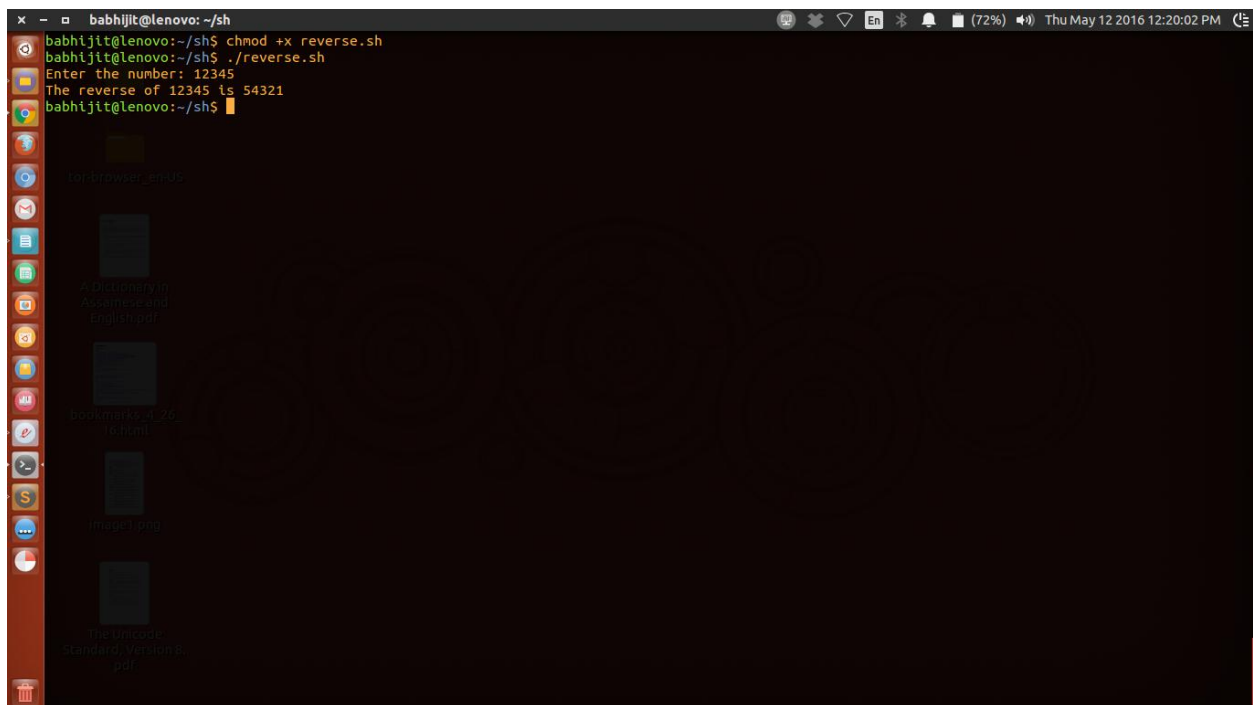
    res=$(( 10 * $res + re ));

    n=$(( $n / 10 ));

done

echo "The reverse of $m is $res";
```

Output:-

A screenshot of a Linux terminal window. The window title is "babhijit@lenovo: ~/sh". The terminal shows the following commands and output:   
1. `babhijit@lenovo:~/sh$ chmod +x reverse.sh`   
2. `babhijit@lenovo:~/sh$ ./reverse.sh`   
3. The script prompts "Enter the number: " and the user enters "12345".   
4. The script outputs "The reverse of 12345 is 54321".   
5. The prompt returns to `babhijit@lenovo:~/sh$`.   
The terminal background is black with white text. On the left side, there is a vertical dock with various application icons. The top of the window shows system status icons including network, battery (72%), and time (Thu May 12 2016 12:20:02 PM).

P18:- Write a shell program to calculate simple interest.

Program:-

```
#!/bin/sh

echo -n "Enter the principal: ";

read p;

echo -n "Enter the rate: ";

read r;

echo -n "Enter the duration(in yrs): ";

read n;

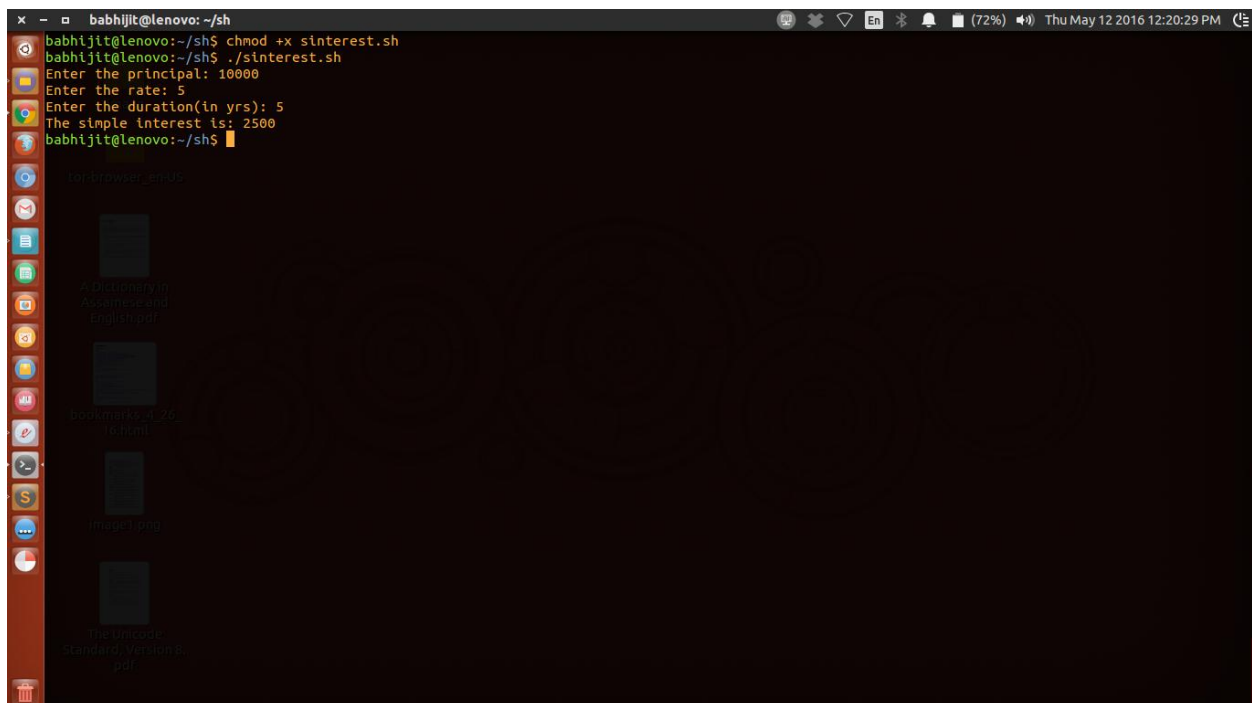
si=0;

x=$((p \* r \* n));

si=$((x/100));

echo "The simple interest is: $si";
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has executed the following commands and received the following output:

```
babhijit@lenovo:~/sh$ chmod +x sinterest.sh
babhijit@lenovo:~/sh$ ./sinterest.sh
Enter the principal: 10000
Enter the rate: 5
Enter the duration(in yrs): 5
The simple interest is: 2500
babhijit@lenovo:~/sh$
```

The terminal window also displays a sidebar with various application icons and a taskbar at the bottom showing the date and time as 'Thu May 12 2016 12:20:29 PM'.

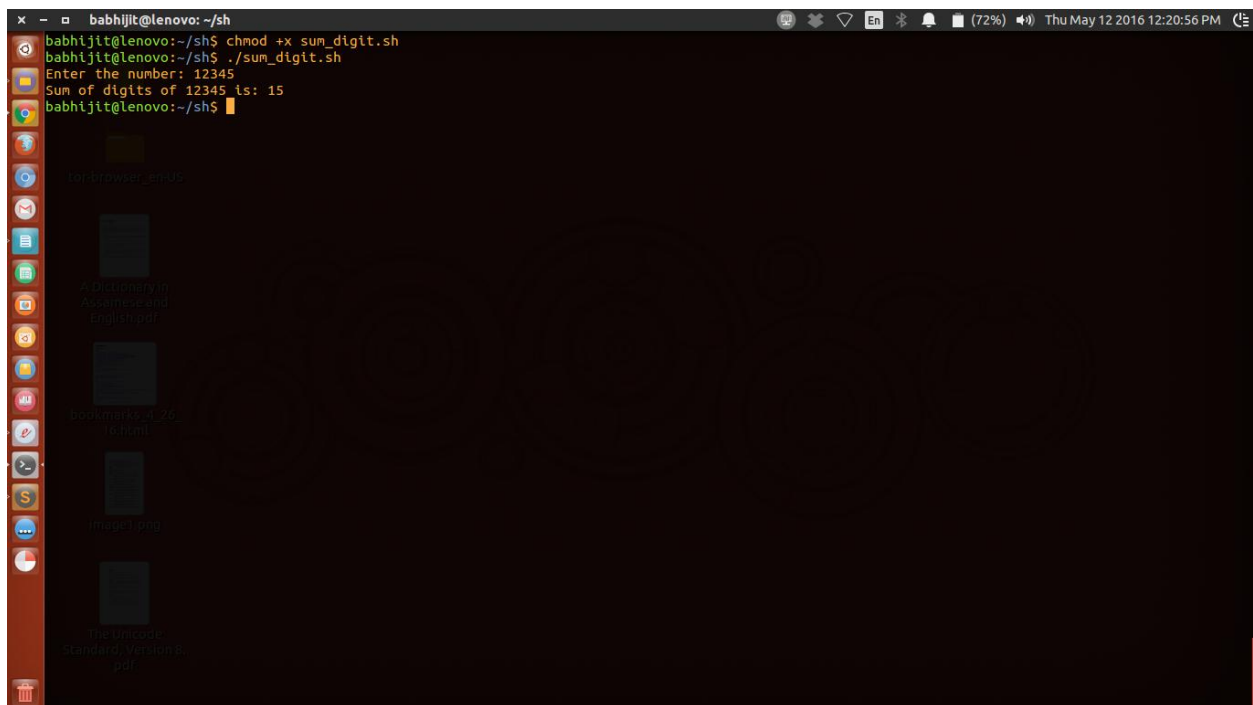
P19:- Write a shell program to find the sum of the digits of a number.

Program:-

```
#!/bin/sh

echo -n "Enter the number: ";
read n;
m=$n;
while [ "$n" -ne 0 ]
do
    re=$((n%10));
    res=$((res+$re));
    n=$((n/10));
done
echo "Sum of digits of $m is: $res";
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has executed the following commands:

```
babhijit@lenovo:~/sh$ chmod +x sum_digit.sh
babhijit@lenovo:~/sh$ ./sum_digit.sh
Enter the number: 12345
Sum of digits of 12345 is: 15
babhijit@lenovo:~/sh$
```

The terminal output shows the script successfully calculating the sum of the digits of 12345 as 15. The desktop background is dark, and the terminal window is in the foreground.

P20:- Write a shell program to swap 2 numbers.

Program:-

```
#!/bin/sh

echo -n "Enter the number: ";

read n;

m=$n;

while [ "$n" -ne 0 ]

do

    re=$((n%10));

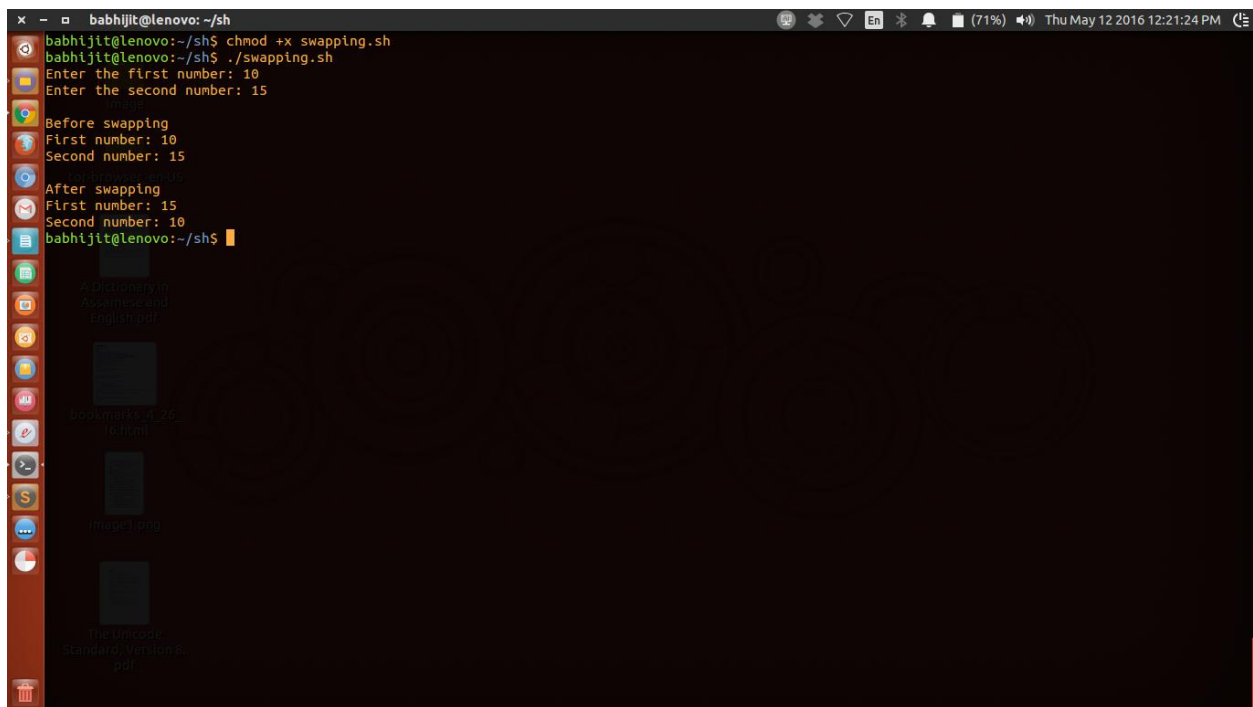
    res=$((res+$re));

    n=$((n/10));

done

echo "Sum of digits of $m is: $res";
```

Output:-



The screenshot shows a terminal window titled 'babhijit@lenovo: ~/sh'. The user has executed the following commands:

```
babhijit@lenovo:~/sh$ chmod +x swapping.sh
babhijit@lenovo:~/sh$ ./swapping.sh
Enter the first number: 10
Enter the second number: 15
```

The output of the script is displayed as follows:

```
Before swapping
First number: 10
Second number: 15
After swapping
First number: 15
Second number: 10
babhijit@lenovo:~/sh$
```

The terminal window also shows a sidebar with various application icons and a system tray at the bottom right indicating the date and time as 'Thu May 12 2016 12:21:24 PM'.

P21:- Write a shell program to convert a decimal number to equivalent binary number.

Program:-

```
#!/bin/sh

echo -n "Enter the decimal number: ";

read num;

n=$num;

p=0;

res=0;

x=0;

k=0;

flag=0;

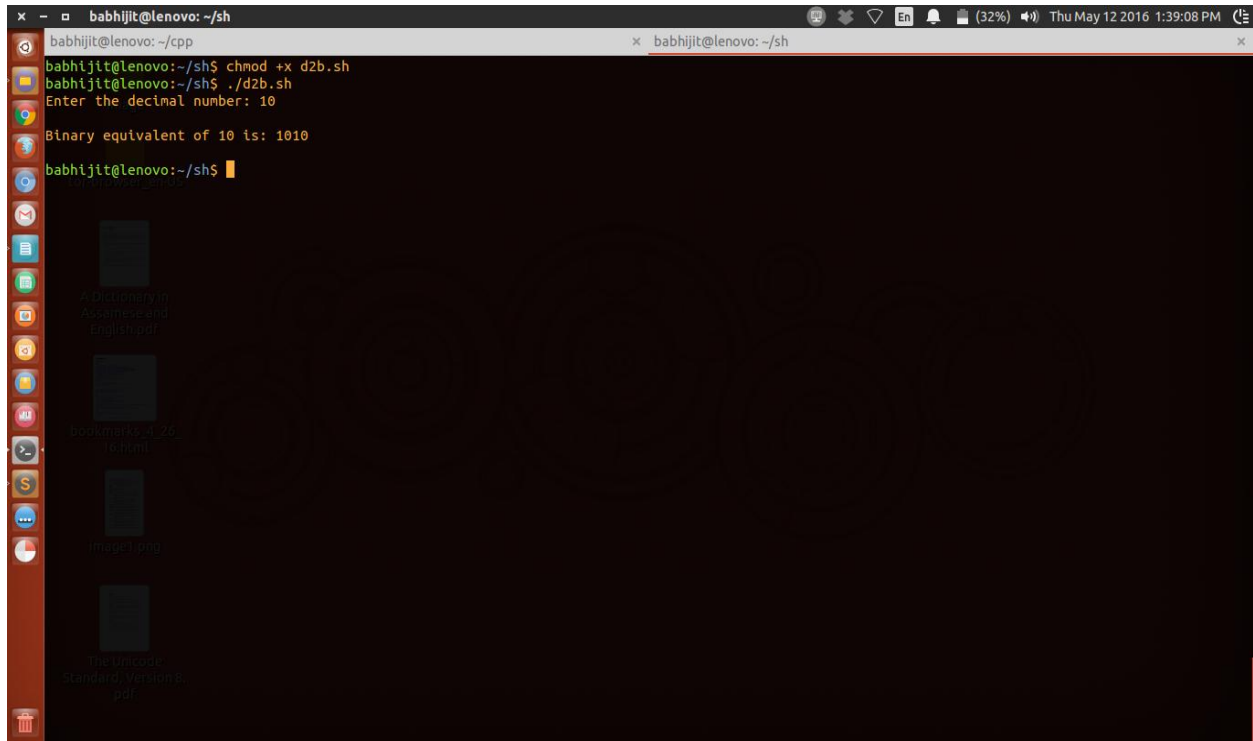
while [ "$n" -gt 0 ]
do
    r=$((n%2));
    if [ "$r" -eq 0 -a "$flag" -eq 0 ]
    then
        k=$((k+1));
    else
        flag=1;
    fi
    x=$((res * 10));
    res=$((r+$x));
    n=$((n/2));
done

n=$res;
```

```

res=0;
x=0;
while [ "$n" -gt 0 ]
do
    r=$((n%10));
    x=$((res * 10));
    res=$((r+x));
    n=$((n/10));
done
if [ "$k" -gt 0 ]
then
    for i in $(bash -c "echo {1..${k}}")
    do
        res=$((res * 10));
    done
fi
echo "\nBinary equivalent of $num is: $res\n";

```

Output:-

```
babhijit@lenovo: ~/sh
babhijit@lenovo: ~/cpp
babhijit@lenovo: ~/sh$ chmod +x d2b.sh
babhijit@lenovo: ~/sh$ ./d2b.sh
Enter the decimal number: 10
Binary equivalent of 10 is: 1010
babhijit@lenovo: ~/sh$
```

The screenshot shows a Linux desktop environment with a terminal window open. The terminal displays the execution of a script named `d2b.sh` which converts the decimal number 10 to its binary equivalent, 1010. The desktop background is dark with a large, faint watermark that reads "© Babhijit". On the left side of the desktop, there is a vertical dock containing several application icons. Below the dock, four PDF files are visible on the desktop: "A History of the American and English.pdf", "downward-1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2

P22:- Write a shell program to generate the Fibonacci series.

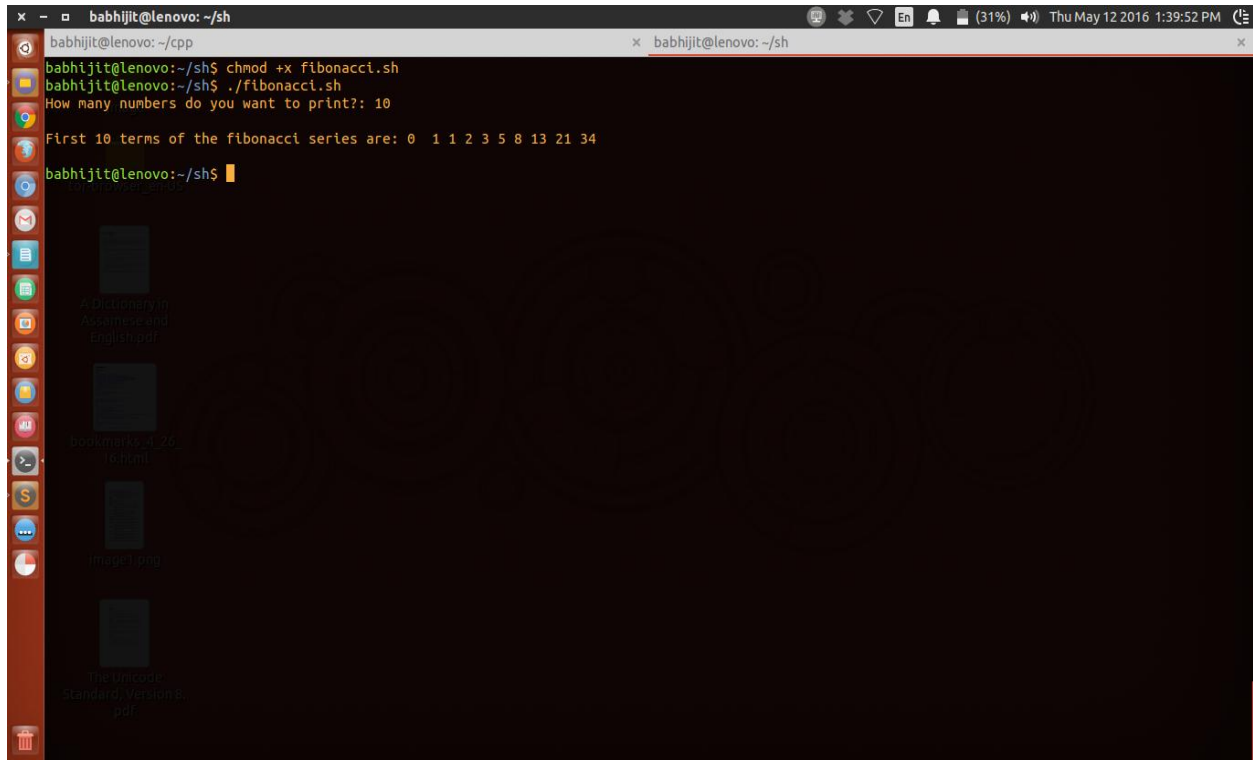
Program:-

```
#!/bin/sh

echo -n "How many numbers do you want to print?: ";
read num;
fterm=0;
sterm=1;
nterm=0;
count=2;
echo -n "\nFirst $num terms of the fibonacci series are: ";
echo -n "$fterm $sterm ";
while [ "$count" -lt "$num" ]
do
    nterm=$((fterm+sterm));
    echo -n "$nterm ";
    fterm=$sterm;
    sterm=$nterm;
    count=$((count+1));
done
echo "\n";
```



## Output:-



The screenshot shows a terminal window titled "babhijit@lenovo: ~/sh". The user has executed the following commands:

```
babhijit@lenovo:~/sh$ chmod +x fibonacci.sh
babhijit@lenovo:~/sh$ ./fibonacci.sh
How many numbers do you want to print?: 10
First 10 terms of the fibonacci series are: 0 1 1 2 3 5 8 13 21 34
babhijit@lenovo:~/sh$
```

The terminal output displays the first 10 terms of the Fibonacci series. The desktop background is dark with a large, faint watermark that reads "BASIC". On the left side of the desktop, there is a vertical dock with several application icons. Below the dock, there are four PDF files visible: "A Dictionary in Assamese and English.pdf", "Bachchan Ki 126 B.M.M.pdf", "image1.png", and "The Unicode Standard, Version 8.pdf".

P23:- Write a shell program to read a number of strings and to display them.

Program:-

```
#!/bin/sh
echo -n "What is your name?: ";
read name
clear
echo "Hello $name";
echo -n "What is your favorite color?: ";
read color
clear
echo "$color is a good color";
echo "Now saving that info";
echo "Favorite color of $name is $color";
echo "Data saved";
echo "Press enter to continue";
read
clear
echo "Have a good day $name";
```

P24:- Write a shell program to convert a binary number to equivalent decimal number.

Program:-

```
#!/bin/sh

echo -n "Enter the binary number: ";

read num;

q=$num;

res=0;

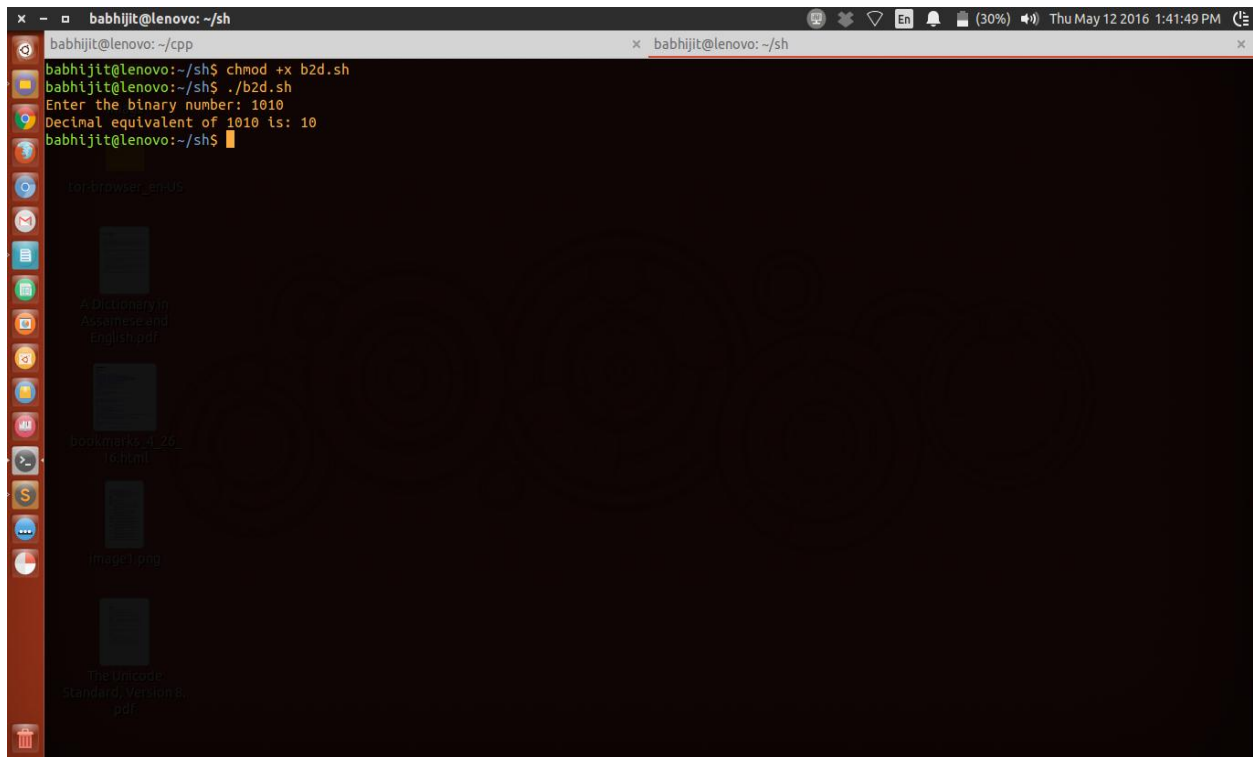
k=0;

pow=1;

while [ "$q" -ne 0 ]
do
    if [ "$k" -eq 0 ]
    then
        r=$((q%10));
        q=$((q/10));
        k=$((k+1));
        res=$((res+$r \* 1));
        var=$r;
        continue;
    fi
    r=$((q%10));
    for i in $(bash -c "echo {1..{$k}}")
    do
        pow=$((pow \* 2));
    done
done
```

```
res=$((res+$r \* $pow));  
q=$((q/10));  
k=$((k+1));  
  
done  
  
echo "Decimal equivalent of $num is: $((res))";
```

### Output:-



```
babhijit@lenovo: ~/sh  
babhijit@lenovo:~/sh$ chmod +x b2d.sh  
babhijit@lenovo:~/sh$ ./b2d.sh  
Enter the binary number: 1010  
Decimal equivalent of 1010 is: 10  
babhijit@lenovo:~/sh$
```

P25:- Write a shell program to implement bubble sort algorithm.

Program:-

```
#!/bin/bash

temp=0;

echo -n "Enter the size of the array: ";

read num;

echo -e "Enter the array\n";

for i in $(bash -c "echo {1..${num}}")
do
    echo -n "Enter number $i: ";

    read n;

    array[$i]=$n;
done

echo -n "The array is: "

for i in $(bash -c "echo {1..${num}}")
do
    echo -n " ${array[$i]} ";
done

echo -e "\n";

for i in $(bash -c "echo {1..$(( ${num} - 1 ))}")
do
    echo "Pass $i: ";

    for j in $(bash -c "echo {1..$(( ${num} - $i ))}")
    do
        if [ ${array[$j]} -gt ${array[$j+1]} ]
```

```

then
    temp=${array[$j+1]};
    array[$j+1]=${array[$j]};
    array[$j]=$temp;
    #echo "true";
fi
for i in $(bash -c "echo {1..${num}}")
do
    echo -n "${array[$i]} ";
done
echo -e "\n";
done

done
echo -n "The sorted array is: "
for i in $(bash -c "echo {1..${num}}")
do
    echo -n "${array[$i]} ";
done
echo -e "\n";

```

Output:-

```

babhijit@lenovo: ~/sh
babhijit@lenovo: ~/cpp
babhijit@lenovo:~/sh$ chmod +x bubble.sh
babhijit@lenovo:~/sh$ ./bubble.sh
Enter the size of the array: 7
Enter the array
Enter number 1: 4
Enter number 2: 3
Enter number 3: 1
Enter number 4: 0
Enter number 5: 2
Enter number 6: 7
Enter number 7: 5
The array is: 4 3 1 0 2 7 5
Pass 1:
3 4 1 0 2 7 5
3 1 4 0 2 7 5
3 1 0 4 2 7 5
3 1 0 2 4 7 5
3 1 0 2 4 7 5
3 1 0 2 4 5 7
Pass 2:
1 3 0 2 4 5 7
1 0 3 2 4 5 7
1 0 2 3 4 5 7
1 0 2 3 4 5 7
1 0 2 3 4 5 7
Pass 3:

```

```

babhijit@lenovo: ~/sh
babhijit@lenovo: ~/cpp
babhijit@lenovo:~/sh$ ./bubble.sh
Pass 3:
0 1 2 3 4 5 7
0 1 2 3 4 5 7
0 1 2 3 4 5 7
0 1 2 3 4 5 7
Pass 4:
0 1 2 3 4 5 7
0 1 2 3 4 5 7
0 1 2 3 4 5 7
Pass 5:
0 1 2 3 4 5 7
0 1 2 3 4 5 7
Pass 6:
0 1 2 3 4 5 7
The sorted array is: 0 1 2 3 4 5 7
babhijit@lenovo:~/sh$
babhijit@lenovo:~/sh$

```

P26:- Write a shell program to implement insertion sort algorithm.

Program:-

```
#!/bin/bash

isort=();
temp=0;
echo -n "Enter the size of the array: ";
read num;
echo -e "Enter the array\n";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n "Enter number $i: ";
    read n;
    isort[$i]=$n;
done
echo -n "The array is: ";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n " ${isort[$i]} ";
done
echo -e "\n";
for i in $(bash -c "echo {2..${num}}")
do
    echo -e "Pass $((i-1)):\n";
    for j in $(bash -c "echo {1..${i-1}}")
    do
```



```

if [ $((isort[$j])) -gt $((isort[$i])) ]
then
    temp=${isort[$i]};
    isort[$i]=${isort[$j]};
    isort[$j]=$temp;
fi
for k in $(bash -c "echo {1..${num}}")
do
    echo -n " ${isort[$k]} ";
done
echo -e "\n";
done
done
echo -n "The sorted array is: ";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n " ${isort[$i]} ";
done
echo -e "\n";

```

Output:-

```

babhijit@lenovo: ~/cpp
babhijit@lenovo:~/sh$ chmod +x insert.sh
babhijit@lenovo:~/sh$ ./insert.sh
Enter the size of the array: 7
Enter the array
Enter number 1: 5
Enter number 2: 3
Enter number 3: 2
Enter number 4: 1
Enter number 5: 4
Enter number 6: 0
Enter number 7: 7
The array is: 5 3 2 1 4 0 7
Pass 1:
3 5 2 1 4 0 7
Pass 2:
2 5 3 1 4 0 7
Pass 3:
1 3 5 2 4 0 7
1 2 5 3 4 0 7
1 2 3 5 4 0 7
Pass 4:
1 2 3 5 4 0 7
1 2 3 5 4 0 7
1 2 3 5 4 0 7

```

A screenshot of a Linux terminal window titled "babhijit@lenovo: ~/cpp". The terminal shows the execution of a C++ program that implements Selection Sort. It prompts for two passes of input. Pass 4 has inputs [1, 2, 3, 5, 4, 0, 7] and [1, 2, 3, 4, 5, 0, 7]. Pass 5 has inputs [0, 2, 3, 4, 5, 1, 7], [0, 1, 3, 4, 5, 2, 7], [0, 1, 2, 4, 5, 3, 7], [0, 1, 2, 3, 5, 4, 7], and [0, 1, 2, 3, 4, 5, 7]. Pass 6 has inputs [0, 1, 2, 3, 4, 5, 7], [0, 1, 2, 3, 4, 5, 7], [0, 1, 2, 3, 4, 5, 7], [0, 1, 2, 3, 4, 5, 7], [0, 1, 2, 3, 4, 5, 7], and [0, 1, 2, 3, 4, 5, 7]. The final output is "The sorted array is: 0 1 2 3 4 5 7". The terminal interface includes a sidebar with application icons and a top status bar showing system information like battery level (35%) and time (Thu May 12 2016 1:47:03 PM).

P27:- Write a shell program to implement selection sort algorithm.

Program:-

```
#!/bin/bash

ssort=();
temp=0;
echo -n "Enter the size of the array: ";
read num;
echo -e "Enter the array\n";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n "Enter number $i: ";
    read n;
    ssort[$i]=$n;
done
echo -n "The array is: ";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n " ${ssort[$i]} ";
done
echo -e "\n";
for i in $(bash -c "echo {1..$(( ${num} - 1 ))}")
do
    echo -e "Pass $i:\n";
    for j in $(bash -c "echo {${i}+1}..${num}")
    do
```

```

if [ $((ssort[$i])) -gt $((ssort[$j])) ]
then
    temp=${ssort[$i]};
    ssort[$i]=${ssort[$j]};
    ssort[$j]=$temp;
fi
for k in $(bash -c "echo {1..${num}}")
do
    echo -n " ${ssort[$k]} ";
done
echo -e "\n";
done
done
echo -n "The sorted array is: ";
for i in $(bash -c "echo {1..${num}}")
do
    echo -n " ${ssort[$i]} ";
done
echo -e "\n";

```

Output:-

```

babhijit@lenovo: ~/sh
babhijit@lenovo: ~/cpp
babhijit@lenovo:~/sh$ chmod +x select.sh
babhijit@lenovo:~/sh$ ./select.sh
Enter the size of the array: 7
Enter the array
Enter number 1: 5
Enter number 2: 3
Enter number 3: 2
Enter number 4: 1
Enter number 5: 0
Enter number 6: 7
Enter number 7: 4
The array is: 5 3 2 1 0 7 4
Pass 1:
3 5 2 1 0 7 4
2 5 3 1 0 7 4
1 5 3 2 0 7 4
0 5 3 2 1 7 4
0 5 3 2 1 7 4
0 5 3 2 1 7 4
Pass 2:
0 3 5 2 1 7 4
0 2 5 3 1 7 4
0 1 5 3 2 7 4
0 1 5 3 2 7 4
0 1 5 3 2 7 4

```

```

babhijit@lenovo: ~/sh
babhijit@lenovo: ~/cpp
Pass 3:
0 1 3 5 2 7 4
0 1 2 5 3 7 4
0 1 2 5 3 7 4
0 1 2 5 3 7 4
Pass 4:
0 1 2 3 5 7 4
0 1 2 3 5 7 4
0 1 2 3 5 7 4
Pass 5:
0 1 2 3 5 7 4
0 1 2 3 4 7 5
Pass 6:
0 1 2 3 4 5 7
The sorted array is: 0 1 2 3 4 5 7
babhijit@lenovo:~/sh$
babhijit@lenovo:~/sh$

```