Experiment:1
BASIC COMMANDS AND SCRIPT FILES

1. BASIC FUNCTIONS

Evaluate the following problems by writting the commands in the Command Window, or by writting the program in a script file an then executing the file

- Calculate $\dfrac{(2.5)^3\left(16-\dfrac{216}{22}\right)}{(1.7)^4+14}+\sqrt[4]{2050}$
- Define the variable x as $x=2.34$, then evaluate $\dfrac{e^{2x}}{\sqrt{14+x^2-x}}$
- Define the variables a, b, c and d as: $a=13$, $b=4.2$, $c=\dfrac{(4b)}{a}$ and $d=\dfrac{abc}{a+b+c}$, then evaluate

$$a.\frac{b}{c+d}+\frac{d}{c}\frac{a}{b}-(a-b^2)(c+d)$$

- Verify the below trignometry identity is correct by calculating the values of the left and right sides of the equation, by substituting $x=\dfrac{\pi}{9}$

$$\sin 4x = 4\sin x\cos x - 8\sin^3 x\cos x$$

Solution.

```
a1=((2.5)^3*(16-216/22))/((1.7)^4+14)+ nthroot(2050,4)
```

```
a1 =
        11.05
```

```
x=2.34
```

```
x =
         2.34
```

```
a2=(exp(2*x))/(sqrt(14+x^2-x))
```

```
a2 =
     26.034
```

```
a=13;b=4.2;
c=(4*b)/a
```

```
c =
     1.2923
```

```
d=(a*b*c)/(a+b+c)
```

```
d =
     3.8156
```

```
a3=a*(b/(c+d))+(d/c)*(a/b)-(a-b^2)*(c+d)
```

```
a3 =
     43.529
```

```
y=pi/9
```

```
y =
     0.34907
```

```
LHS=sin(4*y)
```

```
LHS =
     0.98481
```

```
RHS=4 *sin(y)*cos(y)-8*(sin(y))^3*cos(y)
```

```
RHS =
    0.98481
```

■

2. **COMPOUND INTEREST**

The balance B of a savings account after t years when a principal P is invested at an annual increment rate r and the interest is compounded n times a year is given by:

$$B = P\left(1 + \frac{r}{n}\right)^{nt} \tag{1}$$

If the interest is compounded yearly, the balance is given by:

$$B = P(1 + r)^t \tag{2}$$

Suppose Rs. 5000/- is invested for 17 years in one account where the interest is compounded yearly. In addition, Rs 5000/- is invested in a second account in which the interest is compounded monthly. In both accounts the interest rate is 8.5%. Use `MATLAB` to determine how long (in years and months) it would take for the balance in the second account to be the same as the balance of first account after 17 years.

HINT:

(a) Calculate B for Rs 5000/- invested in a yearly compounded interest account after 17 years using Equation (2).

(b) Calculate t for the B calculate in part (a), from the monthly compounded interest formula, Equation (1).

(c) Determine the number of years and months that correspond to t.

Implement this algorithm as MATLAB function script.

Algorithm

// Input: Value(s) principal=5000, rate of interest=0.085, time=17, no. of months=12

// Output: Years and Months.

- Calculate B from Equation (2)
- Solve Equation (1) for t, and calculate t.
- Determine the number of years from the calculated t.
- Determine the number of months using `Ceil` command.

Solution.

```
P=5000; r=0.085; ta=17; n=12;
format short g

% Calculate *B*  from equation 2

B=P*(1+r)^ta

% Solve equation 1 for *t* and calculate *t*

t=log(B/P)/(n*log(1+r/n))
%%
% Determine the number of years.

years=fix(t)
%%
% Determine the number of months.

months=ceil((t-years)*12)
```

```
B =
        20011


t =
      16.374
```

```
years =
    16


months =
     5
```

■