Practical 3 : - Secant Method

Q1 : − Find the 5 th Approximation for the $f(x) = x^3 + 2x^2 - 3x - 1$ in the interval $(1, 2)$ and $p_0 = 2$, $p_1 = 1$.

```
In[•]:= f[x_] := x^3 + 2 x^2 - 3 x - 1;
p1 = 2; p2 = 1;
For[i = 1, i < 5, i++,
 temp = p2;
 p2 = p2 - f[p2] (p2 - p1)/(f[p2] - f[p1]);
 p1 = temp;
]
Print["The 5th Approximation = ", N[p2]]
```

The 5th Approximation = 1.19865

Q2 : − Find the root for the $f(x) = \ln(1 + x) - \cos(x) = 0$ in the interval $(0, 1)$ and $p_0 = 1$, $p_1 = 0$ with tolerance 10^{-6}.

```
In[•]:= Clear["Global*`"];
f[x_] := Log[1 + x] - Cos[x];
p1 = 1; p2 = 0; ϵ = 10^-6;
For[i = 1, i < Infinity, i++,
 temp = p2;
 p2 = p2 - f[p2] (p2 - p1)/(f[p2] - f[p1]);
 p1 = temp;
 If[Abs[p2 - p1] < ϵ, Break[]]
]
Print["The final Approximation = ", N[p2]]
```

The final Approximation = 0.884511

Q3 : – Find the root for the $f(x) = e^{-x} - x = 0$ in the interval $(0, 1)$ and $p_0 = 1$, $p_1 = 0$ with tolerance given 10^{-6}.

In[ ]:=
```
Clear["Global*`"];
f[x_] := Exp[-x] - x;
p1 = 1; p2 = 0; ϵ = 10^-6;
For[i = 1, i < Infinity, i++,
 temp = p2;
 p2 = p2 - f[p2] (p2 - p1)/(f[p2] - f[p1]);
 p1 = temp;
 If[Abs[p2 - p1] < ϵ, Break[]]
]
Print["The final Approximation = ", N[p2], " , iteration number = ", i]
```

```
The final Approximation = 0.567143 , iteration number = 5
```