SECANT METHOD

(PRACTICAL-3)

Que 1:Find the roots of the given function using secant method:x^3+2*x^2-3 x+1

In[44]:=
```
f[x_] := (x ^ 3) + 2 * (x ^ 2) - 3 * x - 1;
```

In[46]:=
```
Subscript[p, 0] = 2;
```

In[47]:=
```
Subscript[p, 1] = 1;
```

In[48]:=
```
eps = 0.000005;
```

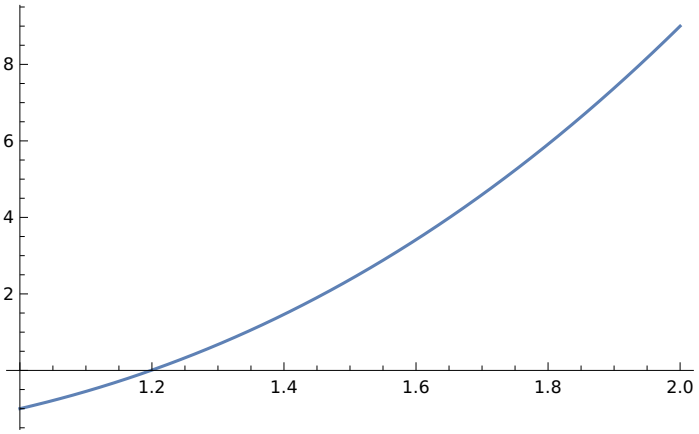
In[49]:=
```
Nmax = 10;
```

In[50]:=
```
For[n = 2, n ≤ Nmax, n++,
Subscript[p, n] =
   N[Subscript[p, n - 1] - f[Subscript[p, n - 1]] * (Subscript[p, n - 1] - Subscript[p, n - 2]) /
       (f[Subscript[p, n - 1]] - f[Subscript[p, n - 2]])];
If[Abs[Subscript[p, n] - Subscript[p, n - 1]] < ϵ, Return[Subscript[p, n]]];
Print[n - 1, "th iteration value is : ", Subscript[p, n]];
Print["Estimated Error is : ", Abs[Subscript[p, n] - Subscript[p, n - 1]]]];
Plot[f[x], {x, 1, 2}]
```

```
1th iteration value is : 1.1
Estimated Error is : 0.1
2th iteration value is : 1.22173
Estimated Error is : 0.121729
3th iteration value is : 1.19649
Estimated Error is : 0.0252442
4th iteration value is : 1.19865
Estimated Error is : 0.00216004
5th iteration value is : 1.19869
Estimated Error is : 0.000045968
```

Out[50]= 1.19869

Out[51]=



Que 2:Find the roots of the given function using secant method:Exp[-x]-x

In[52]:=
```
f[x_] := Exp[-x] - x
```

In[53]:=
```
Subscript[p, 0] = 0;
```

In[54]:=
```
Subscript[p, 1] = 1;
```

In[55]:=
```
eps = 0.000005;
```

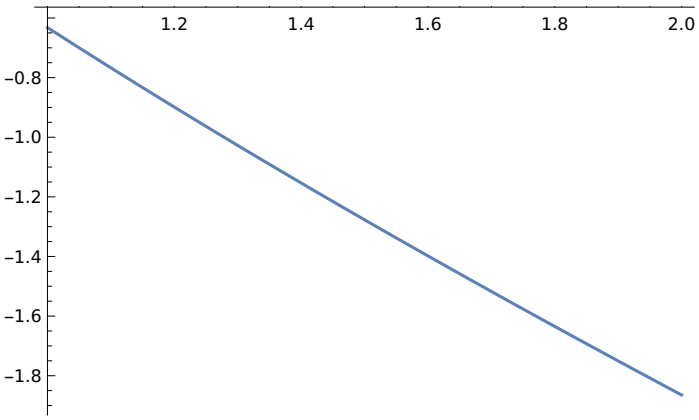
In[56]:=
```
Nmax = 10;
```

In[57]:=
```
For[n = 2, n ≤ Nmax, n++,
Subscript[p, n] =
   N[Subscript[p, n - 1] - f[Subscript[p, n - 1]] * (Subscript[p, n - 1] - Subscript[p, n - 2]) /
       (f[Subscript[p, n - 1]] - f[Subscript[p, n - 2]])];
If[Abs[Subscript[p, n] - Subscript[p, n - 1]] < ϵ, Return[Subscript[p, n]]];
Print[n - 1, "th iteration value is : ", Subscript[p, n]];
Print["Estimated Error is : ", Abs[Subscript[p, n] - Subscript[p, n - 1]]]];
Plot[f[x], {x, 1, 2}]
```

```
1th iteration value is : 0.6127
Estimated Error is : 0.3873
2th iteration value is : 0.563838
Estimated Error is : 0.0488614
3th iteration value is : 0.56717
Estimated Error is : 0.00333197
4th iteration value is : 0.567143
Estimated Error is : 0.0000270518
```

Out[57]= 0.567143

Out[58]=



Que 3 : Find the roots of the given function using secant method : x ^ 3 – 13

In[59]:=
```
f[x_] := x ^ 3 - 13
```

In[60]:=
```
Subscript[p, 0] = 0;
```

In[62]:=
```
Subscript[p, 1] = 3;
```

In[63]:=
```
eps = 0.000005;
```

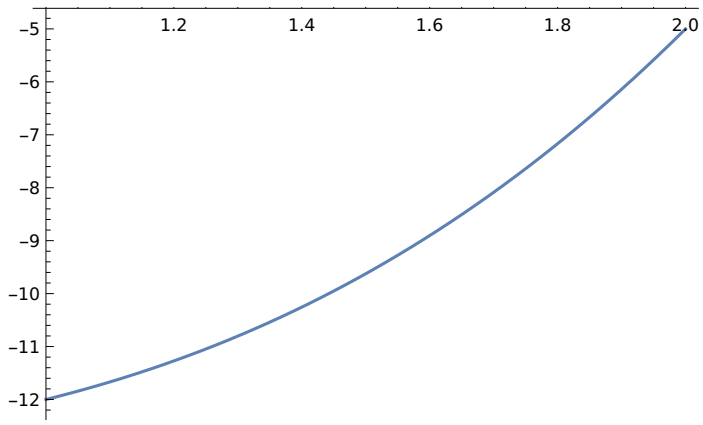
In[64]:=
```
Nmax = 10;
```

In[65]:=
```
For[n = 2, n ≤ Nmax, n++,
Subscript[p, n] =
   N[Subscript[p, n - 1] - f[Subscript[p, n - 1]] * (Subscript[p, n - 1] - Subscript[p, n - 2]) /
       (f[Subscript[p, n - 1]] - f[Subscript[p, n - 2]])];
If[Abs[Subscript[p, n] - Subscript[p, n - 1]] < ϵ, Return[Subscript[p, n]]];
Print[n - 1, "th iteration value is : ", Subscript[p, n]];
Print["Estimated Error is : ", Abs[Subscript[p, n] - Subscript[p, n - 1]]]];
Plot[f[x], {x, 1, 2}]
```

```
1th iteration value is : 1.44444
Estimated Error is : 1.55556
2th iteration value is : 2.09207
Estimated Error is : 0.647629
3th iteration value is : 2.49729
Estimated Error is : 0.405212
4th iteration value is : 2.33475
Estimated Error is : 0.162534
5th iteration value is : 2.35034
Estimated Error is : 0.0155903
6th iteration value is : 2.35134
Estimated Error is : 0.000999479
7th iteration value is : 2.35133
Estimated Error is : 7.03717 × 10^-6
```

Out[65]= 2.35133

Out[66]=



Que 4 : Find the roots of the given function using secant method : x ^ 3 – 3 * x ^ 2 + 2 * x + 5

In[67]:=
```
f[x_] := x ^ 3 - 3 * x ^ 2 + 2 * x + 5
```

In[68]:=
```
Subscript[p, 0] = 0;
```

In[69]:=
```
Subscript[p, 1] = -1;
```

In[70]:=
```
eps = 0.000005;
```

In[71]:=
```
Nmax = 10;
```

In[72]:=
```
For[n = 2, n ≤ Nmax, n++,
Subscript[p, n] =
   N[Subscript[p, n - 1] - f[Subscript[p, n - 1]] * (Subscript[p, n - 1] - Subscript[p, n - 2]) /
       (f[Subscript[p, n - 1]] - f[Subscript[p, n - 2]])];
If[Abs[Subscript[p, n] - Subscript[p, n - 1]] < ϵ, Return[Subscript[p, n]]];
Print[n - 1, "th iteration value is : ", Subscript[p, n]];
Print["Estimated Error is : ", Abs[Subscript[p, n] - Subscript[p, n - 1]]]];
Plot[f[x], {x, 1, 2}]
```

```
1th iteration value is : -0.833333

Estimated Error is : 0.166667

2th iteration value is : -0.900277

Estimated Error is : 0.0669437

3th iteration value is : -0.904325

Estimated Error is : 0.00404786

4th iteration value is : -0.90416

Estimated Error is : 0.000164377
```

Out[72]= -0.904161

Out[73]=