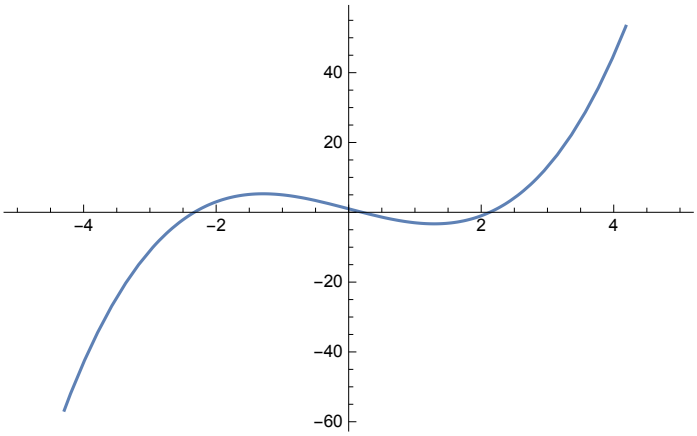
In[•]:=
```
SecantME[x0_, x1_, error_, f_] :=
  Module[{xk, xk1, xk2}, xk = N[x0]; xk1 = N[x1]; xk2 = xk1;
   i = 0;
   Output = {};
   While[Abs[f[xk2]] > error,
    xk2 = (xk * f[xk1] - xk1 * f[xk]) / (f[xk1] - f[xk]);
    interval =
     "[" <> ToString[NumberForm[xk, 12]] <> "," <> ToString[NumberForm[xk1, 12]] <> "]";
    xk = xk1; xk1 = xk2;
    i++;
    Output = Append[Output, {i, interval, xk2, f[xk2]}];];
   Print[NumberForm[
     TableForm[Output, TableHeadings → {None, {"i", "Interval", "xi", "f[xi]"}}], 8]];
   Print["Number of iterations required to achieve desired accuracy = ", i];
   Print["Root after ", i, " iterations = ", NumberForm[xk2, 8]];
   Print["Function value at approximate root, f[xi] = ", NumberForm[f[xk2], 8]];];
```

Question 1

```
f[x_] := x^3 - 5 x + 1;
error = 10^(-4);
Plot[f[x], {x, -5, 5}]
```

Out[•]=



In[•]:=
```
SecantME[0, 1, error, f]
```

i	Interval	xi	f[xi]
1	[0.,1.]	0.25	-0.234375
2	[1.,0.25]	0.18644068	0.074277312
3	[0.25,0.186440677966]	0.20173626	-0.00047111617
4	[0.186440677966,0.201736256179]	0.20163985	-8.642293×10^{-7}

Number of iterations required to achieve desired accuracy = 4

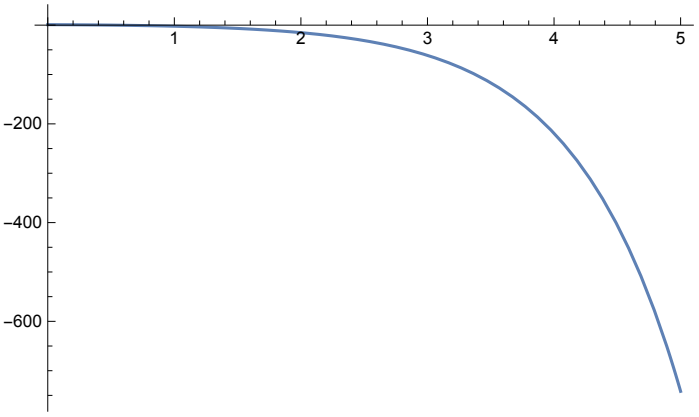
Root after 4 iterations = 0.20163985

Function value at approximate root, f[xi] = -8.642293×10^{-7}

In[ ]:=
Question 2

```
f[x_] := Cos[x] - x * Exp[x];
error = 10^(-4);
Plot[f[x], {x, 0, 5}]
```

Out[ ]=



In[ ]:=
```
SecantME[0, 1, error, f]
```

i	Interval	xi	f[xi]
1	[0.,1.]	0.31466534	0.51987117
2	[1.,0.314665337801]	0.44672814	0.20354478
3	[0.314665337801,0.446728144591]	0.53170586	-0.042931093
4	[0.446728144591,0.531705860645]	0.51690447	0.0025927631
5	[0.531705860645,0.516904467567]	0.51774747	0.000030111941

Number of iterations required to achieve desired accuracy = 5

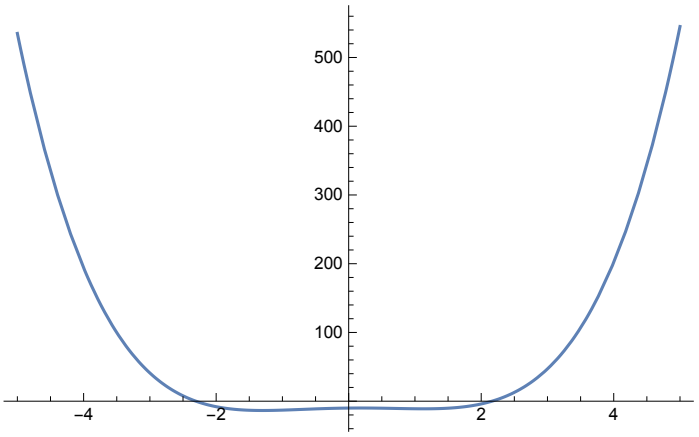
Root after 5 iterations = 0.51774747

Function value at approximate root, f[xi] = 0.000030111941

In[ ]:=
Question 3

```
f[x_] := x^4 - 3 * x^2 + x - 10;
error = 10^(-4);
Plot[f[x], {x, -5, 5}]
```

Out[ ]=



In[ ]:=
```
SecantME[2, 3, error, f]
```

i	Interval	xi	f[xi]
1	[2.,3.]	2.0784314	−2.2198625
2	[3.,2.07843137255]	2.119995	−1.1637008
3	[2.07843137255,2.11999499205]	2.1657906	0.096032538
4	[2.11999499205,2.16579064846]	2.1622995	−0.0036507762
5	[2.16579064846,2.16229953415]	2.1624274	−0.000010786812

Number of iterations required to achieve desired accuracy = 5

Root after 5 iterations = 2.1624274

Function value at approximate root, f[xi] = −0.000010786812