In[ ]:=
```
SecantMWI[x0_, x1_, n_, f_] :=
  Module[{xk, xk1, xk2}, xk = N[x0]; xk1 = N[x1];
   i = 0;
   Output = {};
   While[i < n,
    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["Root after ", n, " 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;
SecantMWI[0, 1, 6, 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}
5	[0.201736256179,0.201639852891]	0.20163968	1.0352719×10^{-11}
6	[0.201639852891,0.201639675721]	0.20163968	-2.220446×10^{-16}

Root after 6 iterations = 0.20163968

Function value at approximate root, f[xi] = -2.220446×10^{-16}

In[ ]:=

Question 2

```
f[x_] := Cos[x] - x * Exp[x];
SecantMWI[0, 1, 8, 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
6	[0.516904467567,0.517747465271]	0.51775737	-2.1513165×10^{-8}
7	[0.517747465271,0.517757370754]	0.51775736	1.7807977×10^{-13}
8	[0.517757370754,0.517757363682]	0.51775736	-3.3306691×10^{-16}

Root after 8 iterations = 0.51775736

Function value at approximate root, f[xi] = -3.3306691×10^{-16}

In[ ]:=

Question 3

```
f[x_] := x^4 - 3 * x^2 + x - 10;
SecantMWI[2, 3, 7, 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
6	[2.16229953415,2.16242739183]	2.1624278	1.2174048×10^{-9}
7	[2.16242739183,2.16242777073]	2.1624278	1.7763568×10^{-15}

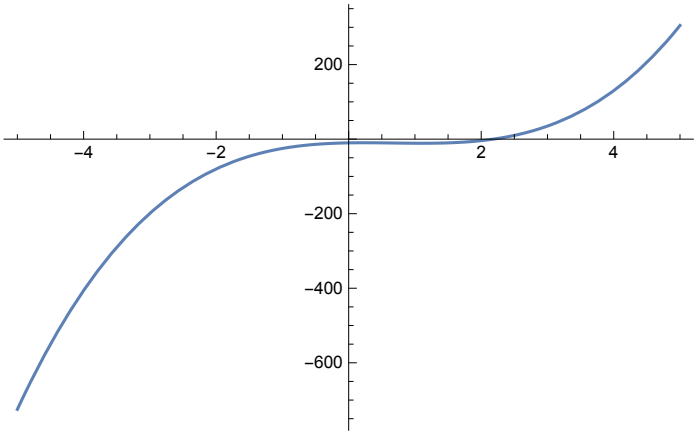
Root after 7 iterations = 2.1624278

Function value at approximate root, f[xi] = 1.7763568×10^{-15}

In[ ]:=
Question 4

```
f[x_] := 4 * x^3 - 8 * x^2 + 3 * x - 10;
Plot[f[x], {x, -5, 5}]
```

Out[ ]=



In[ ]:=
```
SecantMWI[0, 2, 8, f]
```

i	Interval	xi	f[xi]
1	[0.,2.]	3.3333333	59.259259
2	[2.,3.33333333333]	2.0843091	-2.2820009
3	[3.33333333333,2.08430913349]	2.130624	-1.2362271
4	[2.08430913349,2.13062398529]	2.1853736	0.097391729
5	[2.13062398529,2.18537356592]	2.1813753	-0.0036503741
6	[2.18537356592,2.18137530485]	2.1815198	-0.000010127519
7	[2.18137530485,2.18151975105]	2.1815202	1.0581083×10^{-9}
8	[2.18151975105,2.18152015292]	2.1815202	1.7763568×10^{-15}

Root after 8 iterations = 2.1815202

Function value at approximate root, f[xi] = 1.7763568×10^{-15}