```
g[x_] := x - (x^2 - 2) / (2 x);

p0 = 1.; (* Initial guess*)
tol = 10^-6;
Nmax = 20;
(* Make changes above this line *)
n = 0;
outList = {};
Print["Fixed Point Iteration for g(x) = ", g[x],
  " : initial guess p0 = ", p0, ", tol = ", N[tol], ", and Nmax = ", nMax];
While[n < Nmax ,
  p1 = g[p0];
  If[Abs[p1 - p0] ≤ tol,
   Print["|p_n+1 - p_n| <=  tol, and best estimate is p", n, " = ", p1]; Break[] ];
  Print["n = ", n, "\tp_n+1 = ", p1, "\tp_n+1 - pn = ", p1 - p0];
  p0 = p1;
  n++
 ];
If[n == nMax, Print["Fixed point Iteration did not converge to tolerance ",
   tol, " with Nmax = ", Nmax] ];
```

Fixed Point Iteration for $g(x) = x - \frac{-2 + x^2}{2x}$

: initial guess p0 = 1., tol = $1. \times 10^{-6}$, and Nmax = 10

n = 0 p_n+1 = 1.5 p_n+1 - pn = 0.5

n = 1 p_n+1 = 1.41667 p_n+1 - pn = -0.0833333

n = 2 p_n+1 = 1.41422 p_n+1 - pn = -0.00245098

n = 3 p_n+1 = 1.41421 p_n+1 - pn = -2.1239×10^{-6}

$|p_{n+1} - p_n| <=$ tol, and best estimate is p4 = 1.41421

```
g[x_] := x - (x^2 - 2) / (2 x);
p0 = 3.; (* Initial guess*)
tol = 10^-6;
Nmax = 10;
(* Make changes above this line *)
n = 0;
outList = {};
Print["Fixed Point Iteration for g(x) = ", g[x],
  " : initial guess p0 = ", p0, ", tol = ", N[tol], ", and Nmax = ", nMax];
While[n < Nmax ,
  p1 = g[p0];
  AppendTo[outList,
   {n, N[p1, 18], N[p1 - p0], N[p1 - p], N[Abs[p1 - p] / Abs[p0 - p]],
    N[Abs[p1 - p] / Abs[p0 - p]^phi], N[Abs[p1 - p] / Abs[p0 - p]^2]} ];
  If[Abs[p1 - p0] ≤ tol, Print["|p_n+1 - p_n} <=  tol, and best estimate is p",
    n, " = ", p1]; Break[] ];
  p0 = p1;
  n++];
If[n == nMax, Print["Fixed point Iteration did not converge to tolerance ",
   tol, " with Nmax = ", Nmax] ];
Print[TableForm[outList, TableHeadings → {None,
     {"n", "p_n+1", "p_n+1 -p_n", "p_n+1 -p", "R(1,n)", "R(phi,n)", "R(2,n)"}}] ];
```

Fixed Point Iteration for $g(x) = x - \frac{-2 + x^2}{2x}$

: initial guess p0 = 3., tol = $1. \times 10^{-6}$, and Nmax = 10

$|p_{n+1} - p_n\}$ <= tol, and best estimate is p4 = 1.41421

n	p_n+1	p_n+1 -p_n	p_n+1 -p	R(1,n)	R(phi,n)	R(2,n)
0	1.83333	-1.16667	0.41912	0.264298	0.315196	0.166667
1	1.46212	-0.371212	0.0479076	0.114305	0.0819998	0.272727
2	1.415	-0.0471228	0.000784868	0.0163829	0.00513276	0.341969
3	1.41421	-0.00078465	2.17674×10^{-7}	0.000277339	0.0000180688	0.353357
4	1.41421	-2.17674×10^{-7}	1.66533×10^{-14}	7.65059×10^{-8}	2.18255×10^{-10}	0.35147

```
g[x_] := x - (x^2 - 2) / (2 x);
p = Sqrt[2]; (* the fixed point of g *)
p0 = 3.; (* Initial guess*)
tol = 0;
Nmax = 10;
(* Make changes above this line *)
phi = (Sqrt[5] - 1) / 2;
n = 0;
outList = {};
Print["Fixed Point Iteration for g(x) = ", g[x],
  " : initial guess p0 = ", p0, ", tol = ", N[tol], ", and Nmax = ", nMax];
While[n < Nmax,
  p1 = g[p0];
  AppendTo[outList,
   {n, N[p1, 18], N[p1 - p0], N[p1 - p], N[Abs[p1 - p] / Abs[p0 - p]],
    N[Abs[p1 - p] / Abs[p0 - p]^phi], N[Abs[p1 - p] / Abs[p0 - p]^2]} ];
  If[Abs[p1 - p] ≤ tol, Print["|p_{n+1} - p_n} <=  tol, and best estimate is p",
    n, " = ", p1]; Break[] ];
  p0 = p1;
  n++];
If[n == nMax, Print["Fixed point Iteration did not converge to tolerance ",
   tol, " with Nmax = ", Nmax] ];
Print[TableForm[outList, TableHeadings → {None,
     {"n", "p_n+1", "p_n+1 -p_n", "p_n+1 -p", "R(1,n)", "R(phi,n)", "R(2,n)"}}] ];
```

Fixed Point Iteration for $g(x) = x - \frac{-2 + x^2}{2x}$: initial guess p0 = 3., tol = 0., and Nmax = 10

$|p_{n+1} - p_n\}$ <= tol, and best estimate is p6 = 1.41421

n	p_n+1	p_n+1 -p_n	p_n+1 -p	R(1,n)	R(phi,n)	R(2,n)
0	1.83333	-1.16667	0.41912	0.264298	0.315196	0.16666
1	1.46212	-0.371212	0.0479076	0.114305	0.0819998	0.27272
2	1.415	-0.0471228	0.000784868	0.0163829	0.00513276	0.34196
3	1.41421	-0.00078465	2.17674×10^{-7}	0.000277339	0.0000180688	0.35335
4	1.41421	-2.17674×10^{-7}	1.66533×10^{-14}	7.65059×10^{-8}	2.18255×10^{-10}	0.35147
5	1.41421	-1.68754×10^{-14}	-2.22045×10^{-16}	0.0133333	7.27814×10^{-8}	8.0064 ›
6	1.41421	2.22045×10^{-16}	0.	0.	0.	0.