```
%
%  FIXED-POINT ALGORITHM 2.2
%
%  To find a solution to p = g(p) given an
%  intial approximation p0 (and the function g)
%
%  This code solve Illustration problem on Page 60 of the textbook.
%  formulation (d) is used
%
%   INPUT:   initial approximation p0; tolerance TOL;
%            maximum number of iterations NI.
%
%   OUTPUT:  approximate solution p or
%            a message that the algorithm fails.
%

% -------------clean up --------------------------------
clear all; close all; clc
% -------------------------------------------------------

% Change function g for a new problem
g = @(x) sqrt(10/(x+4));

% --------------initialize the problem-------------------
% initial guess
p0 = 1.5;
% tolerance
TOL = 1e-9;
% maximum number of iterations
NI = 100;
% -------------------------------------------------------

% --------------output on screen -------------------
fprintf('\n Fixed Point Iteration')
fprintf('\n\n  I         P\n')

% STEP 1
i = 1;
converge = false; % convergence flag

% STEP 2
while i<=NI
    % STEP 3
    % compute p(i)
    p = g(p0);
    err = abs(p-p0); % err = |p{N}-p{N-1}|

    % print out all intermediate approximations
    fprintf('%3i    %.9f\n', i, p)

    % STEP 4
    % check if meets the stopping criteria
```

```
    if (err< TOL)
        converge = true;
        break
    else
        % STEP 5
        i = i+1;
        % STEP 6
        p0 = p; % update p0
    end
end

if converge
    fprintf('\n\nApproximate solution P = %.8f\n',p)
    fprintf('Number of iterations = %3i\n',i)
    fprintf('Tolerance = %.3e  |p-pold| = %.3e\n',TOL, err)
else
    fprintf('\n\nInteration number = %3i\n',NI)
    fprintf(' gave approximation  %.8f\n',p)
    fprintf('|p-pold| = %.3e not within tolerance %.3e\n',err, TOL)
end
```

```
 Fixed Point Iteration

  I         P
  1    1.348399725
  2    1.367376372
  3    1.364957015
  4    1.365264748
  5    1.365225594
  6    1.365230576
  7    1.365229942
  8    1.365230023
  9    1.365230012
 10    1.365230014
 11    1.365230013


Approximate solution P = 1.36523001
Number of iterations =  11
Tolerance = 1.000e-09  |p-pold| = 1.661e-10
```

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