

MATLAB code for fixed point algorithm

The MATLAB implementation of the fixed point algorithm can be done in various ways. However, the algorithm should be written as a function so that it can be used on any fixed point problem in any context (sometimes we use these simple algorithms in a much larger code).

Put the algorithm in an easily identified file, say fixedpoint.m. Here is a 'bare-bones' algorithm that lacks certain attractive features:

```
function y = fixedpoint(g,p0,max1)
for k=1:max1
    p0 = g(p0);
end
y = p0;
```

This algorithm will run max1 iterations whether it has converged or not. A better version is

```
function y = fixedpoint(g,p0,tol,max1)
for k=1:max1
    p = g(p0);
    abserr = abs(p-p0);
    relerr = abserr/( abs(p)+eps );
        % eps is a MATLAB defined constant for machine epsilon, to avoid
        % division by 0
    if (abserr<tol) & (relerr<tol)
        break % jump out of the loop; we're done
    end
    p0 = p;
end
if (k==max1)
    disp('The algorithm did not converge')
end
y = p;
```

This version will stop once both error criteria are met. We use both the absolute and relative error to handle both large and small magnitude answers.

If you also want to know the number of iterations, change the output structure to include k as well:

```
function [y,k] = fixedpoint(g,p0,tol,max1)
The rest is the same
```