Exercise 3b (Newton-Raphson)

1) Write a Matlab function file NR.m that makes use of the Newton-Raphson iteration method for $f(x)=0$.
(input: x_0 and maxiter = maximum number of iterations)

2) Apply this to: $f(x)=\sin^2(\pi x)$; $x_0 \in (0, 1/4)$
$=0$

$f(x) = x^3+3x-4=0$; $x_0=$ --

$f(x) = x^3-3x+2=0$; $x_0=$ --

$f(x) = \tan(x-1)=0$; $x_0=$ --

$f(x) = x + e^{-Bx^2}\cdot\cos(x)=0$; $x_0=$ --
$(B = 1, 5, 10, 25, 50)$

!!
(important choice here!)

3) Make plots of the functions f and of the x_i's as a function of i.

4) An extended method:

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)} - \frac{1}{2}\,\frac{(f(x_i))^2 f''(x_i)}{(f'(x_i))^3}.$$

Try this iteration method as well and compare with NR. Is the convergence "faster" or "slower"?