Convex Optimization and Modeling	Jun.-Prof. Matthias Hein
Exercise Sheet 10 - 16.06.2010	due: 23.06.2010

Exercise 21 - Implementation of the barrier method

a. **(3 Points)** Implement the equality constrained Newton method as `NewtonEq.m`

b. **(2 Points)** Solve the following convex optimization problem. The objective is the same as on sheet 9.

$$f(x_1, x_2) = e^{x_1+3x_2-0.1} + e^{x_1-3x_2-0.1} + e^{-x_1+0.1}.$$

But now we have an equality constraint:

$$x_1 - x_2 = 1.$$

Plot the sequence of points (using the plotting routine provided in `Newton.m`).
Use as stopping criterion: $\lambda^2(x) < 10^{-8}$.
Use for stepsize selection: $\sigma = 0.2$, $\beta = 0.5$.

c. **(3 Points)** Implement the barrier method using the equality constrained Newton method as inner loop. Save as `Barrier.m`.

d. **(2 Points)** Solve the following convex optimization problem. The objective is the same as in exercise 10.

$$f(x_1, x_2) = e^{x_1+3x_2-0.1} + e^{x_1-3x_2-0.1} + e^{-x_1+0.1}.$$

But now we have box-constraints:

$$\|x - c\|_\infty \leq 1,$$

where $c = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ and an equality constraint:

$$x_1 - x_2 = 1.$$

Plot the central path (using the plotting routine provided in `Newton.m`). Same parameters as above.

Send the matlab-code and all plots (as `png`-files) to Shyam Rangapuram, email: `r.shyamsundar@gmail.com`.