Problem Set 7 - LV 141.246 QISS - 4.6.2012

1. Cooper-pair box

(a) Create a Matlab function that provides the Cooper-pair box Hamiltonian for the charge states $-nmax, ...nmax$. The function header should look like that:

```
function Hamiltonian = CPB(EJ,Ec,ng,nmax)
```

(b) Calculate the first four energy bands of a Cooper-pair box (Energy versus n_g) for a ratio of $E_J/E_c = 4$.

(c) Check the validity of the Cooper-pair box qubit approximation for the same ratio of $E_J/E_c = 4$.