Homework 3:

For the Shaw problem run the regularization examples from chapter 4 (no need sending the solution).

To motivate use of compressive sampling or sparse sampling perform the following:
For the Shaw problem, solve $||\mathbf{d}-\mathbf{G}\mathbf{m}||_2$

1) assuming $||\mathbf{m}||_0=1$
2) assuming $||\mathbf{m}||_0=2$

Chose a **d** with lots of noise! The $||\mathbf{m}||_0$ means the L0 norm, number of non-zero elements.

We use the convex optimization package CVX
http://cvxr.com/cvx/
To solve |Ax-b| using sparse methods framework.
Note that this is a general convex optimization package. It is not designed for sparse optimization.

1) Install CVX, skim the manual and see the video on the website.

2) Run the Shaw spiky noise problem with 200 or 2000 gridpoints. Try if you can find a good solution using the regularization techniques we have learned so far. Based on my experience this is not easy!

3) The following minimization

$$\min \left\| \mathbf{m}_{CVX} \right\|_1 \qquad \text{subject to} \quad \left\| G\mathbf{m}_{CVX} - \mathbf{d} \right\|_2 < \varepsilon$$

Can be implemented as a CVX optimization

```
cvx_begin
   variable m_cvx(Nsize) ;
   minimize norm(m_cvx,1);
   subject to
       norm((G*m_cvx-dn),2) <=eps
cvx_end
```

Implement the above for the Shaw problem.

4) Implement the Shaw problem with l1 regularization.