GEOP 320
SPRING 2010
QUIZ # 4
(Take Home)

(Due in lecture on 13/4/2010)

Given w(t) = (4,-1) and e(t) = (2/3,1/5):

(a) Find the inverse filter of w(t), $f_2(t) = (f_0, f_1)$, using the:
   (i) Z-transform.
   (ii) Normal equations.

(b) Find the energy percentage error (*E%*) between the actual y(t) and desired d(t)= δ(t) outputs using the inverse filter f(t) found by the:
   (i) Z-transform.
   (ii) Normal equations.

(c) Calculate the seismic trace s(t).

(d) Calculate the deconvolved trace $s_{d2}(t)$ using the inverse filter f(t) found by the:
   (i) Z-transform.
   (ii) Normal equations.

(e) Find the energy percentage error (*L%*) between the deconvolved trace $s_{d2}(t)$ and the earth response e(t) outputs using the inverse filter f(t) found by:
   (i) Z-transform.
   (ii) Normal equations.

(f) Which method has the least error?

(g) Why is the error very small in all cases?

- The energy percentage error (*E%*) between a desired output d(t) and an actual output y(t) is:

$$E(\%) = \frac{\sum_{i=1}^{M} (d_i - y_i)^2}{\sum_{i=1}^{M} d_i^{\,2}} \times 100,$$

where d_i and y_i are the i^{th} samples of d(t) and y(t) and *M* is the number of samples in y(t) or d(t).