GP211. Closed book. 10 minutes. November 2, 2009. Your name ____________________

Here is the theory for inverse linear interpolation:

$$
\mathbf{0} \approx
\left[
\begin{array}{cccccc|ccc}
.8 & .2 & . & . & . & . & & & \\
. & . & 1 & . & . & . & & & \\
. & . & . & . & .5 & .5 & & & \\
\hline
a_0 & . & . & . & . & . & m_0 & . & . \\
a_1 & a_0 & . & . & . & . & m_1 & m_0 & . \\
a_2 & a_1 & a_0 & . & . & . & m_2 & m_1 & m_0 \\
. & a_2 & a_1 & a_0 & . & . & m_3 & m_2 & m_1 \\
. & . & a_2 & a_1 & a_0 & . & m_4 & m_3 & m_2 \\
. & . & . & a_2 & a_1 & a_0 & m_5 & m_4 & m_3 \\
. & . & . & . & a_2 & a_1 & . & m_5 & m_4 \\
. & . & . & . & . & a_2 & . & . & m_5
\end{array}
\right]
\left[
\begin{array}{cc}
\mathbf{I} & \mathbf{0} \\
\mathbf{0} & \mathbf{K}
\end{array}
\right]
\left[
\begin{array}{c}
\Delta m_0 \\
\Delta m_1 \\
\Delta m_2 \\
\Delta m_3 \\
\Delta m_4 \\
\Delta m_5 \\
\Delta m_6 \\
\hline
\Delta a_0 \\
\Delta a_1 \\
\Delta a_2
\end{array}
\right]
+
\left[
\begin{array}{c}
r_{d0} \\
r_{d1} \\
r_{d2} \\
\hline
r_{m0} \\
r_{m1} \\
r_{m2} \\
r_{m3} \\
r_{m4} \\
r_{m5} \\
r_{m6} \\
r_{m7} \\
r_{m8}
\end{array}
\right]
$$

1. What is the value of r_{m2}? (The value changes with each iteration. Your expression for it should be valid at each iteration.)

2. What is the value of r_{d0}? (The value changes with each iteration. Your expression for it should be valid at each iteration.)

3. Why could this solution diverge?

4. Give one way to help avoid divergence.

5. The Seabeam data set is two dimensional but the helix allows us to apply the theory above. Of course we never use matrices except for concepts, but what would be the dimensions of the **K** matrix for a Seabeam example with model `mm(300,400)` and filter `aa(5,3)` ?

6. Draw this **K** matrix.