Inel 5327 **Take Home Test** **Name**:_____

Spring 2009 **StudentID**: _____

Due Date: 20 May 2009 before noon

100 points (25 points each)

1. Find the equivalent filter, H(u,v), that implements in the frequency domain the spatial operation performed by the Laplacian mask $\begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

2. A continuous Gaussian lowpass filter in the continuous frequency domain has the transfer function $H(\mu, \nu) = Ae^{-(\mu^2+\nu^2)/2\sigma^2}$. Show that the corresponding filter in the spatial domain is h(t,z)=A$2\pi\sigma^2 e^{-2\pi^2\sigma^2(t^2+z^2)}$

3. What is contraharmonic filter.
   Explain why the filter is effective in elimination of pepper noise when Q is positive.
   Explain why the filter is effective in eliminating salt noise when Q is negative.
   Explain why the filter gives poor results when the wrong polarity is chosen for Q.

4. What are Wiener and constrained least squares filtering. Explain the difference between them with expressions.