Practise session 6: Restoration of images.

1. Apply the median filter and the adaptive median filter to the image given in Fig. 1. Describe and explain the results you have received. (1p)

2. Remove the (periodic?) noise from the image shown in Fig. 2. (1p)

3. During the imaging, the object has experienced motion. Now the task is to estimate the degradation function and then reconstruct the original image. The captured, noisy image for this task is in Fig. 3. First estimate the motion (in pixels, in which direction) from the image, use *fspecial* to design the filter in spatial domain, and perform the reconstruction in the frequency domain.

   When the degradation function $H(u, v)$ is known, then the estimation of the image can be obtained by the inverse filtering $\hat{F}(u, v) = \frac{G(u,v)}{H(u,v)}$ or by a variant of the Wiener filter as $\hat{F}(u, v) = \left[\frac{1}{H(u,v)} \frac{|H(u,v)|^2}{|H(u,v)|^2 + K} \right] G(u, v).$ (1p)
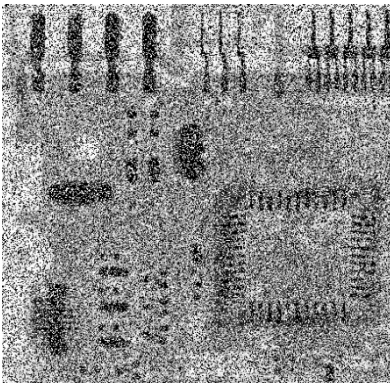
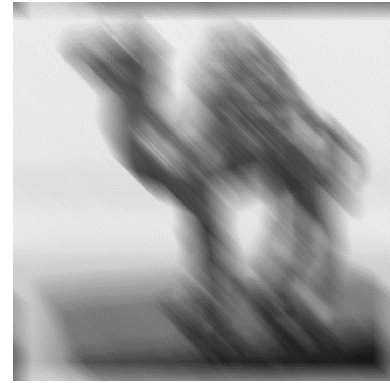Fig. 1. Noisy image, Task 1.   Fig. 2. Noisy image, Task 2.   Fig. 3. Motion, Task 3.