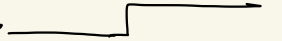
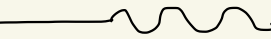
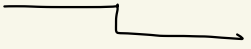
EE 591 HW3, Kagan Ucak

RF : 

Measurement 1 : a contant increase in K_y = G_y 

a sinosodial varying in K_x => G_x 

RF : 

" 2 : a constant decay in K_y => G_y : 

a sinosodial varying in K_x => G_x : 

Part b:)

$\delta_x = \delta_y = 0.3\,cm$, $FOV = 19.2\,cm$, $G_{max} = 1\,G/cm$, $\frac{\gamma}{2\pi} = 42.58 \cdot 10^6 \frac{Hz}{T}$

$\Delta k_y = \frac{1}{FOV_y} \rightarrow k(t) = \frac{\gamma}{2\pi} \int G(t)\,dt$

$\hookrightarrow \int G(t)\,dt = \frac{k \cdot 2\pi}{\gamma}$

$k_{max} = \frac{1}{2\delta_y} = \frac{1}{2 \cdot 0.003m} = 166.7 \frac{cyc}{m}$, $\Delta k_y = \frac{1}{FOV_y} = \frac{1}{19.2cm} = 0.052 \frac{cyc}{cm}$

$N = \frac{2 \cdot k_{max}}{\Delta k_y} = \frac{2 \cdot 1.667 \frac{cyc}{cm}}{0.052 \frac{cyc}{cm}} = 64$

$3.91 \cdot 10^{-6} \frac{Ts}{m} = \int G_x(t)\,dt = \frac{k_{max} \cdot 2\pi}{\gamma}$

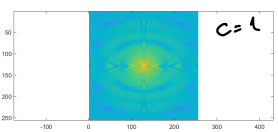
$t_{area} = \frac{\int G_x dt}{G_{max}} = \frac{3.91 \cdot 10^{-6}}{0.01} = 0.391\,ms$

23)

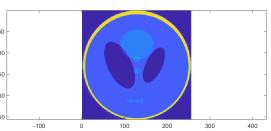
The code is useful for transforming raw 2D FFT scan data into real images. The first 2D FFT image has a Jinc function structure, and the oscillations in the signal are visible in the center vertical axis plot. When we examine the data from the Fourier transform of this data, we observe that it is localized between the x-axis values of 75 and 175, which is already evident in the raw image. Lowering the phase encode results in a reduction in resolution, making the image appear blurry, but its field of view remains unchanged. Conversely, lowering the field of view causes replication islands to appear, but the resolution remains unaffected.

24) a.) $dk_x = 1.4286$
$dk_y = 1.0870$

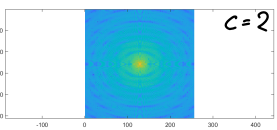
b) c=1

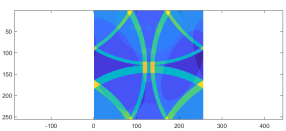


c.)



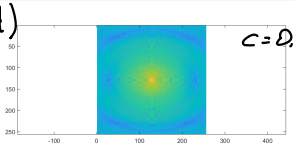
d) c=2





Replications occur in the image. Fov reduced

d) c=0.5



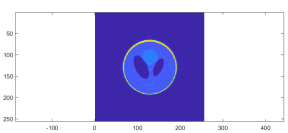


Image looks far away. FOV increased. For lower constant values, the fourier space returns to a distributed(not sharp) jinx function

e) 32×32