MATLAB EXPERIMENT

- Consider an image of size $N \times N$. Call this image $f(x, y)$. You can take an image with your camera/iphone.

- Calculate the 2D DFT of that image. Call this $F(u, v)$. For the 2D DFT use the polar coordinates, i.e., $F(u, v) = |F(u, v)|e^{j\phi(u,v)}$.

- Compare the images of the original 2D DFT amplitude $F(u, v)$. and of a logarithmic mapping of the 2D DFT amplitude of the form $c\log[1 + F(u, v)]$. What do you observe?

- Replace the 2D DFT original amplitude with $|F(u, v)| = 1$. Use inverse DFT and observe how the reconstructed images looks.

- Replace the 2D DFT original phase with $\phi(u, v) = 0$. Use inverse DFT and observe how the reconstructed images looks.

- Consider two images of size $N \times N$. Call these images $f(x, y)$ and $g(x, y)$. You can take images with your camera/iphone.
  Calculate their DFTs $F(u, v) = |F(u, v)|e^{j\phi_F(u,v)}$ and $G(u, v) = |G(u, v)|e^{j\phi_G(u,v)}$
  Take the IDFT of the images $|F(u, v)|e^{j\phi_G(u,v)}$ and $|G(u, v)|e^{j\phi_F(u,v)}$. Notice that in the two later DFT images the amplitude of one of the original images is combined with the phase of the other. Compare the reconstructed images $\mathcal{F}^{-1}\{|F(u, v)|e^{j\phi_G(u,v)}\}$ and $\mathcal{F}^{-1}\{|G(u, v)|e^{j\phi_F(u,v)}\}$.