

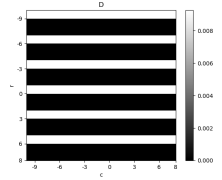
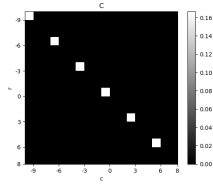
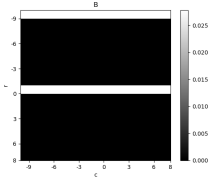
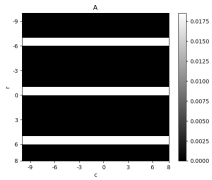
6.003: Signal Processing

Filtering Images

November 18, 2021

Filtering Images

Which of the following space-domain images can be constructed by filtering one of the other images by the DFT of another of them?

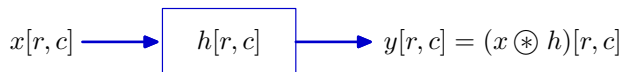


Filtering Images

Filter model:



Space-domain interpretation:



Frequency-domain interpretation:

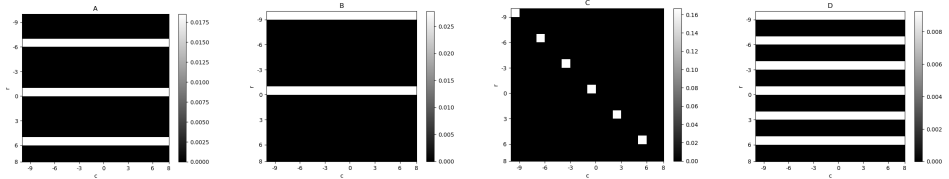


We should be able to understand the previous problem both ways.

Filtering Images

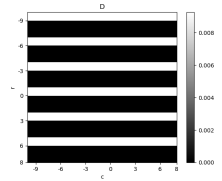
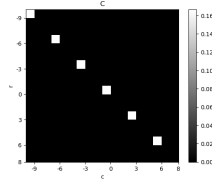
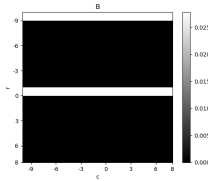
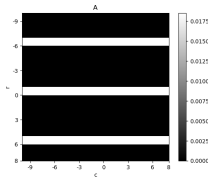
Which of the following images can be constructed by

- circularly convolving two of the other images
- inverse transforming the product of the DFTs of two images



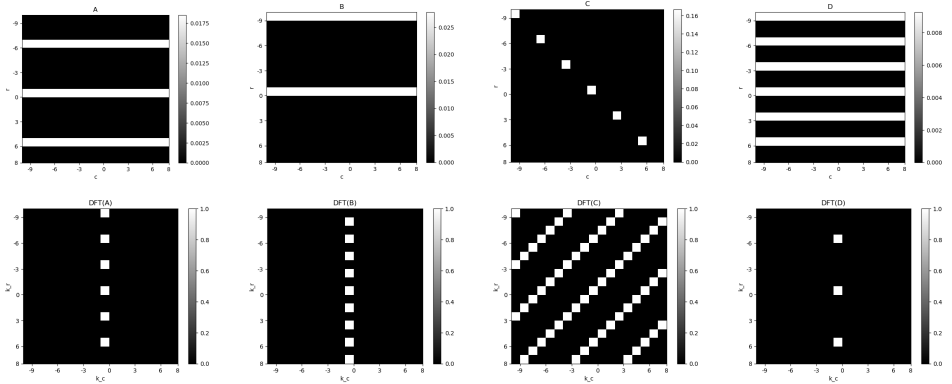
Filtering Images

Try the transform method.



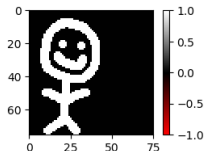
Filtering Images

Try the transform method.

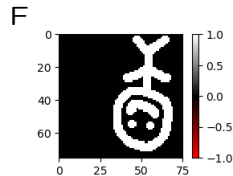
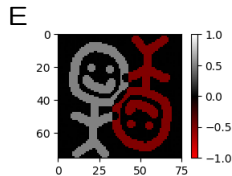
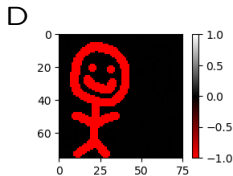
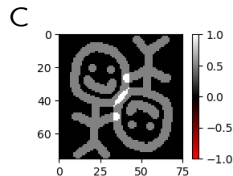
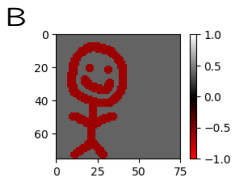
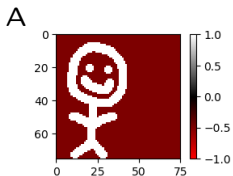


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

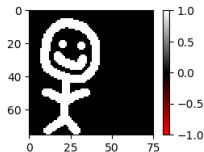


Which of A-F (if any) shows the iDFT of the real part of X ?

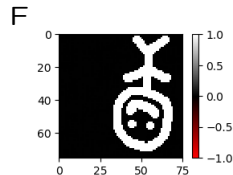
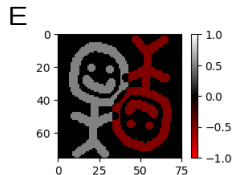
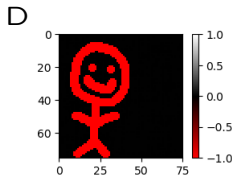
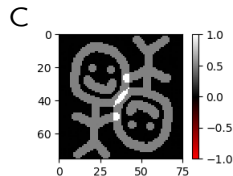
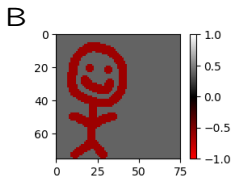
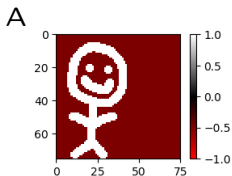


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

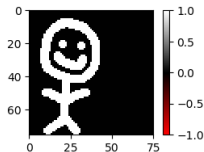


Which of A-F (if any) shows the iDFT of the real part of X ? **C**

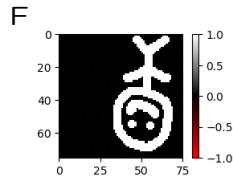
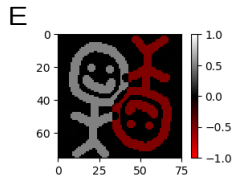
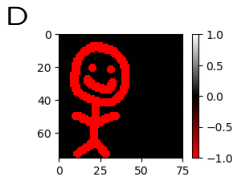
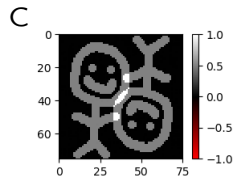
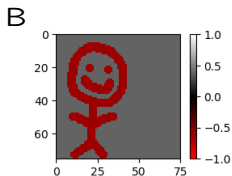
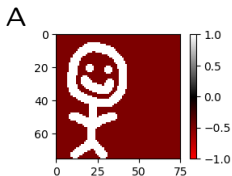


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

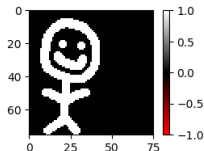


Which (if any) shows the iDFT of the imaginary part of X ?

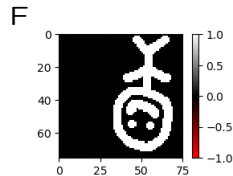
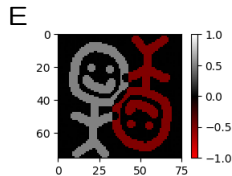
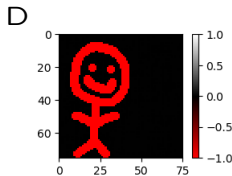
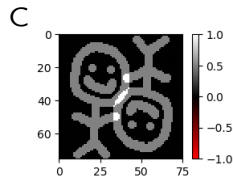
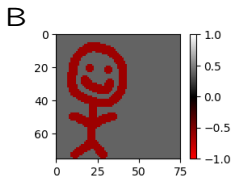
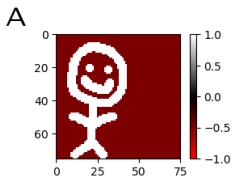


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

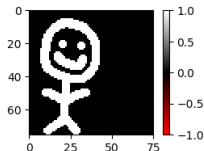


Which (if any) shows the iDFT of the imaginary part of X ? **None**

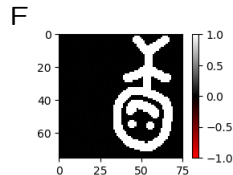
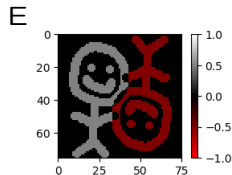
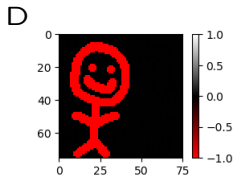
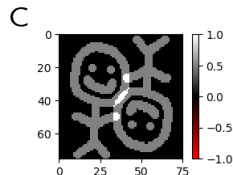
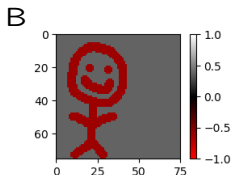
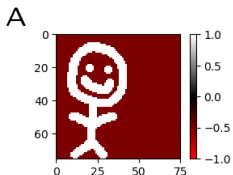


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

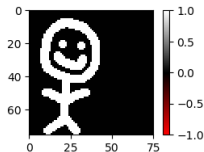


Which (if any) shows the iDFT of j times the imaginary part of X ?

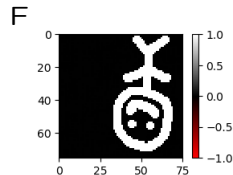
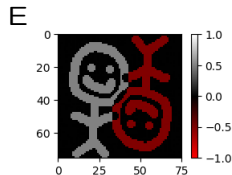
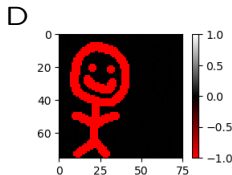
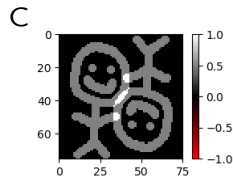
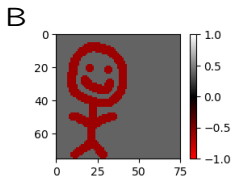
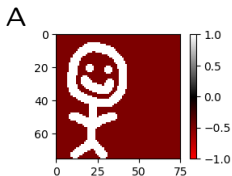


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

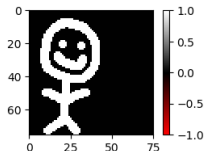


Which (if any) shows the iDFT of j times the imaginary part of X ? **E**

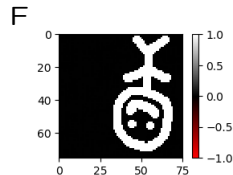
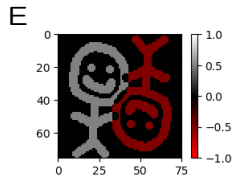
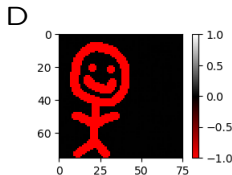
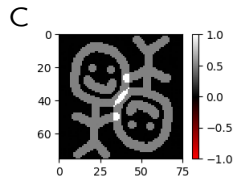
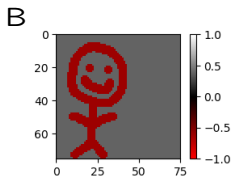
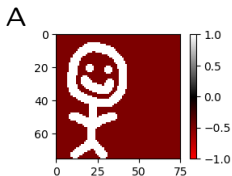


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

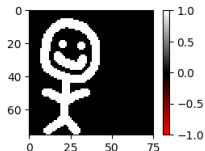


Which (if any) shows the iDFT of X after setting $X[0,0] = 0$.

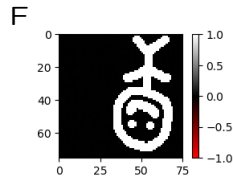
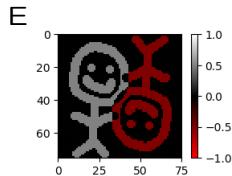
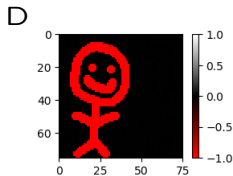
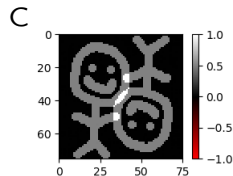
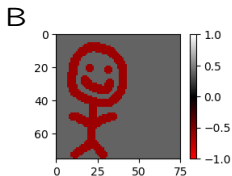
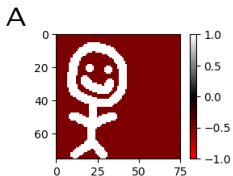


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

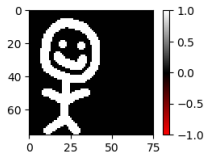


Which (if any) shows the iDFT of X after setting $X[0,0] = 0$. **A**

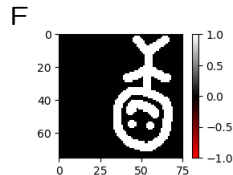
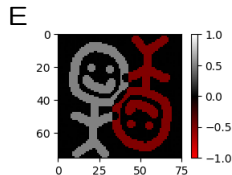
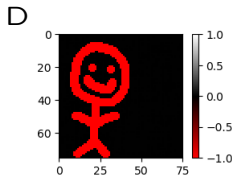
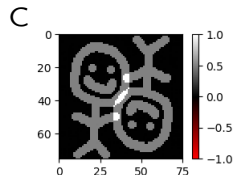
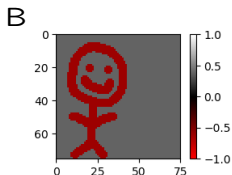
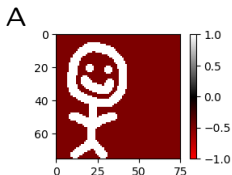


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

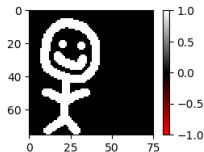


Which (if any) shows the iDFT of X after multiplying every value by $e^{j\pi}$.



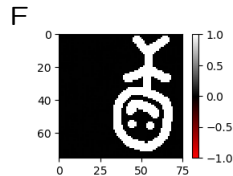
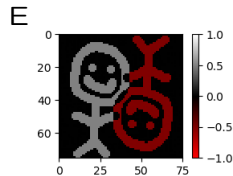
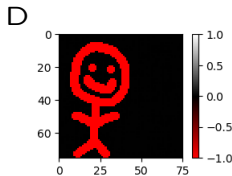
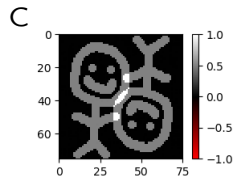
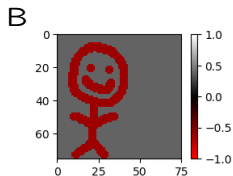
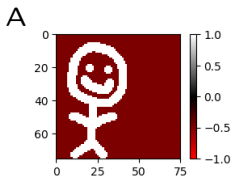
Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.



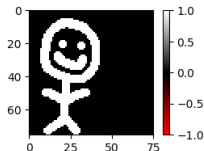
Which (if any) shows the iDFT of X after multiplying every value by $e^{j\pi}$.

D

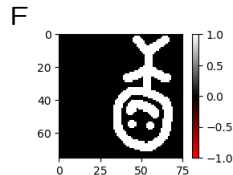
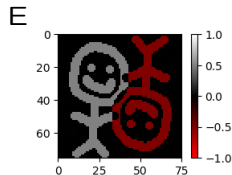
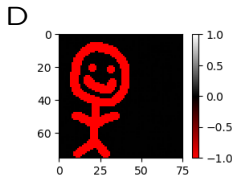
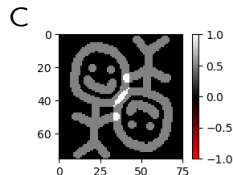
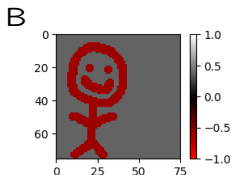
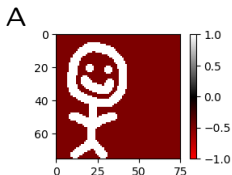


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

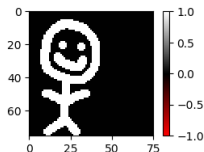


Which (if any) shows the iDFT of X after multiplying every value except $X[0,0]$ by $e^{j\pi}$.

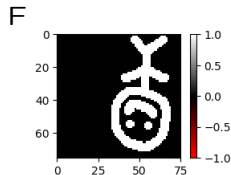
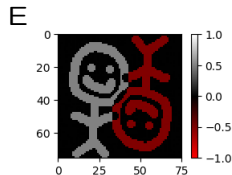
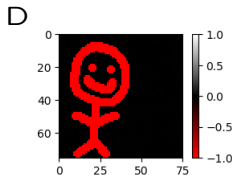
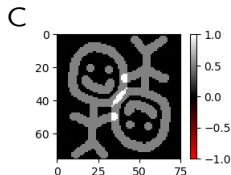
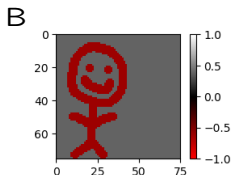
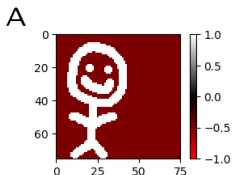


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

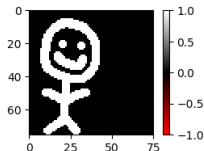


Which (if any) shows the iDFT of X after multiplying every value except $X[0,0]$ by $e^{j\pi}$. **B**

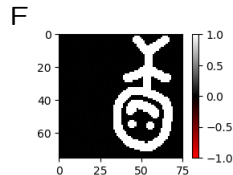
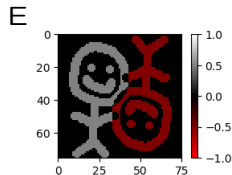
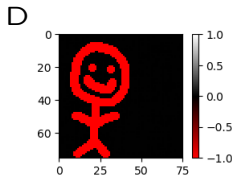
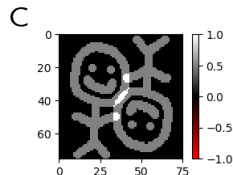
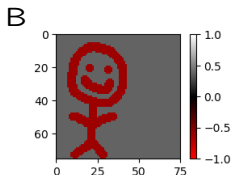
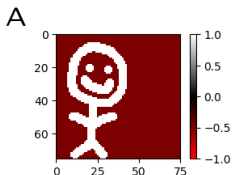


Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.

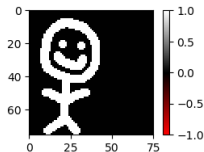


Which (if any) shows the iDFT of X after negating the phase of each point in X .



Stickmen

Let $X[k_r, k_c]$ represent the 2D DFT of the following image.



Which (if any) shows the iDFT of X after negating the phase of each point in X . **F**

