

Assignment Convolutions and Filters due 02/02/2022 at 02:14pm EET

Problem 1. (1 point) METUNCC/Applied_Math/fourier/Disc_Conv.pg

(A) Compute the (infinite) discrete convolution

$$(2, -1, 4, -4) * (-5, 3, -5, -2).$$

$$f * g = \underline{\hspace{2cm}}$$

(B) Compute the cyclic discrete convolution

$$(2, -1, 4, -4) \circledast (-5, 3, -5, -2).$$

$$f \circledast g = \underline{\hspace{2cm}}$$

Please enter you answer in the form "(x, x, x, x)" – with commas separating entries, surrounded by parenthesis.

Problem 2. (1 point) METUNCC/Applied_Math/fourier/Disc_Filter.pgFind a vector \vec{g} so that if $\mathcal{F}\{\vec{f}\} = (c_0, c_1, c_2, c_3)$ then $\mathcal{F}\{\vec{f} \circledast \vec{g}\} = (c_0, 2c_1, 2c_2, 2c_3)$.

$$\vec{g} = \left(\underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \right)$$

Problem 3. (1 point) METUNCC/Applied_Math/fourier/Disc_Filter-inv.pgFind a complex vector \vec{d} so that if $\mathcal{F}\{(f_0, f_1, f_2, f_3)\} = \vec{c}$ then $\mathcal{F}\{(f_0, 0, -f_2, -f_3)\} = \vec{c} \circledast \vec{d}$.

$$\vec{d} = \left(\underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \right)$$