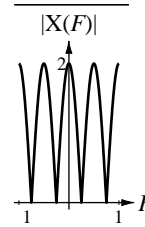


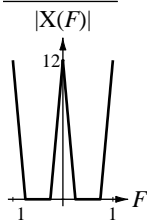
# Solution to ECE Test #10 F03

1.  $\delta[n+1] + \delta[n-1] \xrightarrow{\mathcal{F}} e^{j2\pi F} + e^{-j2\pi F} = 2\cos(2\pi F)$

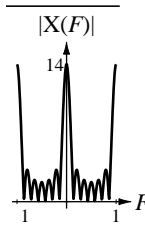


2.  $-3\text{sinc}^2\left(\frac{n}{4}\right) \xrightarrow{\mathcal{F}} -3 \times [4\text{rect}(4F) * \text{comb}(F)] \otimes [4\text{rect}(4F) * \text{comb}(F)]$

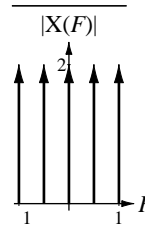
$-3\text{sinc}^2\left(\frac{n}{4}\right) \xrightarrow{\mathcal{F}} -48 \times \text{rect}(4F) * \text{rect}(4F) * \text{comb}(F) = -12\text{tri}(4F) * \text{comb}(F)$



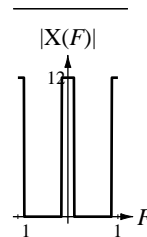
3.  $2\text{rect}_3[n-3] \xrightarrow{\mathcal{F}} 14\text{drcl}(F, 7)$



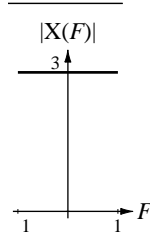
4.  $-4\text{comb}_2[n] \xrightarrow{\mathcal{F}} -4\text{comb}(2F) = -2 \sum_{k=-\infty}^{\infty} \delta\left(F - \frac{k}{2}\right)$



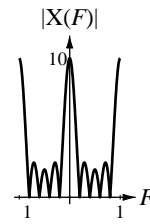
5.  $3\text{sinc}\left(\frac{n}{4}\right) \xrightarrow{\mathcal{F}} 12\text{rect}(4F) * \text{comb}(F)$



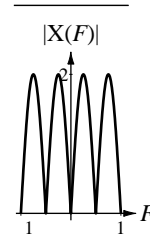
6.  $3\text{sinc}(n) \xleftrightarrow{\mathcal{F}} 3\text{rect}(F) * \text{comb}(F) = 3$



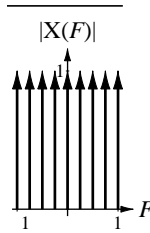
7.  $2\text{rect}_2[n-3] \xleftrightarrow{\mathcal{F}} 10\text{drcl}(F,5)e^{j6\pi F}$



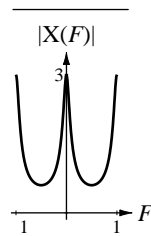
8.  $\delta[n+1] - \delta[n-1] \xleftrightarrow{\mathcal{F}} e^{j2\pi F} - e^{-j2\pi F} = j2\sin(2\pi F)$



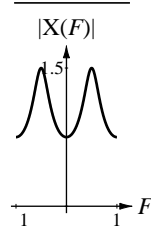
9.  $4\text{comb}_4[n] \xleftrightarrow{\mathcal{F}} 4\text{comb}(4F) = \sum_{k=-\infty}^{\infty} \delta\left(F - \frac{k}{4}\right)$



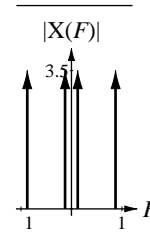
10.  $\left(\frac{2}{3}\right)^n u[n] \xleftrightarrow{\mathcal{F}} \frac{1}{1 - \frac{2}{3}e^{-j2\pi F}}$



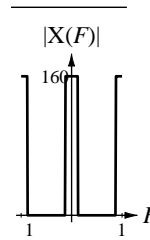
$$11. \left(-\frac{1}{3}\right)^n u[n] \xleftrightarrow{\mathcal{F}} \frac{1}{1 + \frac{1}{3}e^{-j2\pi F}}$$



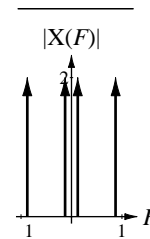
$$12. 7\cos\left(\frac{2\pi n}{8}\right) \xleftrightarrow{\mathcal{F}} \frac{7}{2} \left[ \text{comb}\left(F - \frac{1}{8}\right) + \text{comb}\left(F + \frac{1}{8}\right) \right]$$



$$13. 5\text{sinc}\left(\frac{n}{4}\right) * 2\text{sinc}\left(\frac{n}{4}\right) \xleftrightarrow{\mathcal{F}} 10 \left[ 4\text{rect}(4F) * \text{comb}(F) \right] \left[ 4\text{rect}(4F) * \text{comb}(F) \right]$$



$$5\text{sinc}\left(\frac{n}{4}\right) * 2\text{sinc}\left(\frac{n}{4}\right) \xleftrightarrow{\mathcal{F}} 160\text{rect}(4F) * \text{comb}(F)$$



$$14. 4\sin\left(\frac{2\pi n}{8}\right) \xleftrightarrow{\mathcal{F}} j2 \left[ \text{comb}\left(F + \frac{1}{8}\right) - \text{comb}\left(F - \frac{1}{8}\right) \right]$$