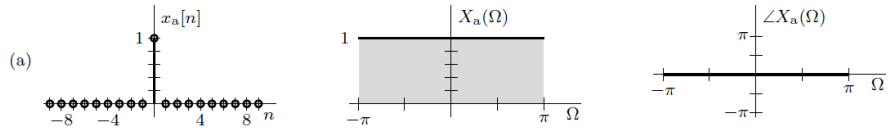
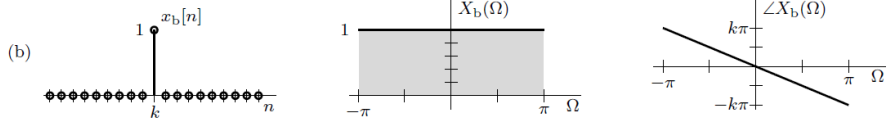


Answer Keys to HW 7

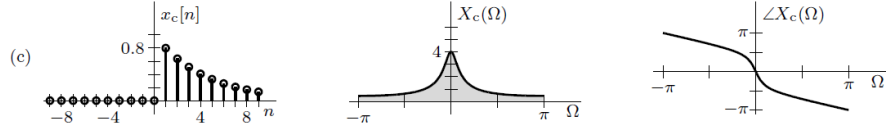
1a) 1



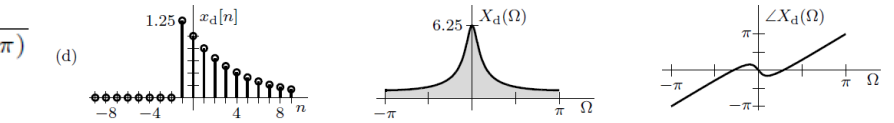
1b) $e^{-j\Omega k}$



1c) $\frac{\gamma e^{-j\Omega}}{1 - \gamma e^{-j\Omega}}$

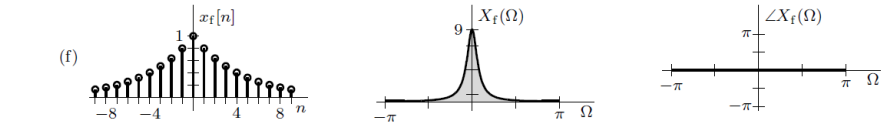
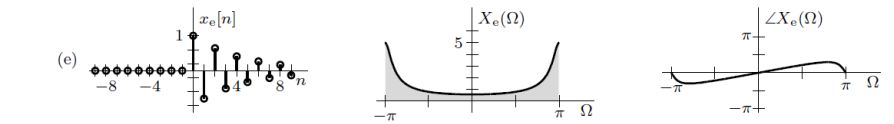


1d) $\frac{\frac{1}{\gamma} e^{j\Omega}}{1 - \gamma e^{-j\Omega}}$



1e) $\frac{1}{1 + \gamma e^{-j\Omega}} = \frac{1}{1 - \gamma e^{-j(\Omega+\pi)}}$

1f) $\frac{1 - \gamma^2}{1 - 2\gamma \cos(\Omega) + \gamma^2}$



2a)
$$\frac{2e^{j6\Omega} - e^{-j2\Omega} - e^{-j9\Omega}}{1 - e^{-j\Omega}}$$

2b)
$$\frac{1.5}{N_0} \left(\frac{e^{j\Omega} + [N_0(e^{j\Omega} - 1) - 1]e^{j\Omega(N_0+1)}}{(e^{j\Omega} - 1)^2} + \frac{e^{-j\Omega} + [N_0(e^{-j\Omega} - 1) - 1]e^{-j\Omega(N_0+1)}}{(e^{-j\Omega} - 1)^2} \right)$$

3)
$$\frac{\sin(2n) + \sin(n)}{\pi n} = \frac{1}{\pi} \text{sinc}\left(\frac{n}{\pi}\right) + \frac{2}{\pi} \text{sinc}\left(\frac{2n}{\pi}\right)$$

4a)
$$e^{-j4\Omega} [4 \cos(\Omega) + 8 \cos(2\Omega)]$$

4b)
$$e^{-j3\Omega} [3 + 4 \cos(\Omega) + 2 \cos(2\Omega)]$$

$$5a) e^{-j4\Omega} \frac{\sin(4.5\Omega)}{\sin(0.5\Omega)}$$

$$5b) e^{-jm\Omega} \left(\frac{e^{j\Omega}}{e^{j\Omega} - \gamma} \right) = \frac{e^{j(1-m)\Omega}}{e^{j\Omega} - \gamma}$$

$$5c) \frac{ae^{j\Omega} (\gamma^{-3} - \gamma^7 e^{-j10\Omega})}{e^{j\Omega} - \gamma}$$

$$5d) \gamma^{-m} \frac{e^{j\Omega}}{e^{j\Omega} - \gamma}$$

$$5e) \gamma^m \frac{e^{j(1-m)\Omega}}{e^{j\Omega} - \gamma}$$

$$5f) \frac{\gamma e^{j\Omega} e^{-jm\Omega}}{(e^{j\Omega} - \gamma)^2} = \frac{\gamma e^{j(1-m)\Omega}}{(e^{j\Omega} - \gamma)^2}$$

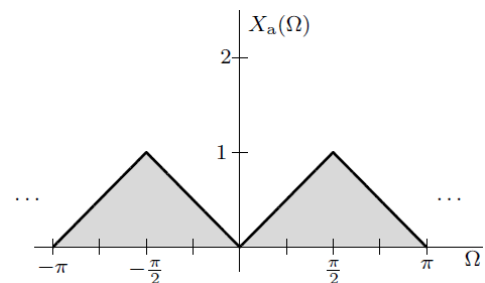
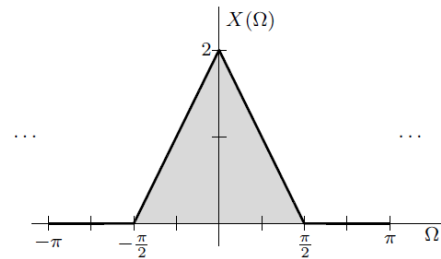
$$6) X(\Omega) = 2 \sum_{k=-\infty}^{\infty} \Lambda \left(\frac{\Omega - 2\pi k}{\pi} \right)$$

$$6a) \frac{1}{2} \left[X(\Omega - \frac{\pi}{2}) + X(\Omega + \frac{\pi}{2}) \right]$$

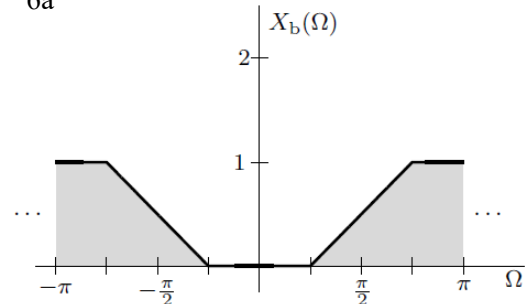
$$6b) \frac{1}{2} \left[X(\Omega - \frac{3\pi}{4}) + X(\Omega + \frac{3\pi}{4}) \right]$$

$$6c) \frac{1}{2} [X(\Omega - \pi) + X(\Omega + \pi)]$$

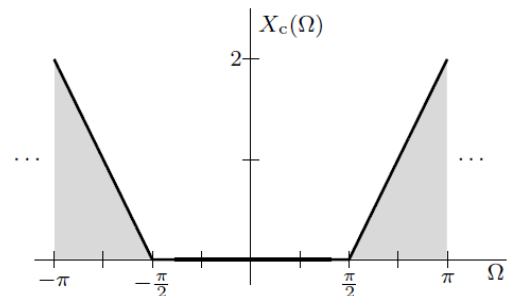
Problem 6



6a



6b



6c