Signals and Systems

HW#3 Answer

3.50





3.51





3.54





3.55





3.59

<https://zh.wikipedia.org/wiki/%E7%9F%A9%E5%BD%A2%E5%87%BD%E6%95%B0>

(b)$X\left(jω\right)=\frac{4sin⁡(2ω-4)}{2ω-4}-\frac{4sin⁡(2ω+4)}{2ω+4}$

$$ \frac{2\sin(\left(ω\right))}{ω}↔rect\left(\frac{t}{2}\right)=\left\{\begin{array}{c}1, |t|\leq 1\\0,otherwise\end{array}\right.$$

$$ S(j2ω)↔\frac{1}{2}s(\frac{t}{2})$$

$$S(j(ω-2))↔e^{j2t}s(t)$$

$$ x\left(t\right)=rect\left(\frac{t}{4}\right)e^{j2t}-rect\left(\frac{t}{4}\right)e^{-j2t}$$

$$=2j×rect\left(\frac{t}{4}\right)sin⁡(2t)$$

(d)$X\left(jω\right)=\frac{d}{dω}\left[4sin⁡(4ω)\frac{sin⁡(2ω)}{ω}\right] $

$$ S\left(jω\right)=\frac{2\sin(\left(2ω\right))}{ω}↔s\left(t\right)=rect\left(\frac{t}{4}\right)=\left\{\begin{array}{c}1, |t|\leq 2\\0, otherwise\end{array}\right.$$

$$ S\_{1}\left(jω\right)=2\sin(\left(4ω\right))S\left(jω\right)↔s\_{1}\left(t\right)=-js\left(t+4\right)+js(j-4)$$

$$X\left(jω\right)=\frac{d}{dω}S\_{1}\left(jω\right)↔x\left(t\right)=-jts\_{1}(t)$$

$$ x\left(t\right) = -t×rect\left(\frac{t+4}{4}\right)+t×rect\left(\frac{t-4}{4}\right)$$

3.60





3.62

1. $y\left(t\right)=x(\frac{t-2}{2})$

$$Y\left(jω\right)=e^{-j2ω}2X\left(j2ω\right)=2e^{-j2ω}\frac{sin⁡(2ω)}{ω}$$



3.67





3.68







3.74



