

Homework #3  
Due Su 10/02

Note:

OW Oppenheim and Wilsky  
SSS Schaum's Signals and Systems  
SPR Schaum's Probability, Random Variables, and Random Processes

Be sure to show all your work for credit.

1. (SSS 5.75)
2. (OW 4.21 (a)-(d), (f))
3. (OW 4.22 (a)-(d)) + (SSS 5.69)
4. (OW 4.23)
5. (OW 4.27)
6. (OW 4.34)
7. (OW 4.36)
8. (OW 4.44)
9. (OW 4.51)
10. Correlation

(a) Let the correlation be defined as

$$r(t) = \int_{-\infty}^{\infty} x(\tau) y(t + \tau) d\tau.$$

Express  $R(j\omega) = \mathcal{F}\{r(t)\}$  in terms of  $X(j\omega)$  and  $Y(j\omega)$ , the Fourier transform of  $x(t)$  and  $y(t)$  respectively.

(b) Suppose  $x(t) = y(t) = e^{-|t|}$ . Find  $R(j\omega)$  using frequency domain properties and the relationship derived in (a).

extra Find  $R(j\omega)$  by evaluating the convolution integral in the time domain to get  $r(t)$  and then doing the FT.