HW08

If you scroll down the page in http://cisl.postech.ac.kr/class/eece574/schedule.htm ,

you can find the entire set of problems and some solutions.

A. Solve the following problems
in http://cisl.postech.ac.kr/class/eece574/2014s/exam/574_14exam02.pdf

6.

B. Solve the following
problems in http://cisl.postech.ac.kr/lecture/574_2015sp/15exam03v150624a.pdf

2.

4.

7. (a) - (d)

C. Pappoulis textbook Problems

7-12.

7-32.

D. Solve the following problem.

Problem 1. Suppose that a random variable X is defined on the probability space $(S, \mathcal{B}, P)$ with the sample space $S = \{s \in \mathbb{R} : 0 \leq s \leq 1\}$, the Borel σ-algebra $\mathcal{B}$ for the sample space S, and the Lebesgue measure P. Answer the following questions.

(a) Show that if $X(s) = 1$ then $\{s \in S : X(s) = 1\}) = S$.

(b) Show that if $X(s) = 0$ for $s = 0$ and $X(s) = 1$ for $s > 0$ then $X = 1$ with probability 1, i.e., $P(X = 1) \triangleq P(\{s \in S : X(s) = 1\}) = 1$.

(c) Show that if $X(s) = s$ then X is a uniform random variable on $[0, 1]$, i.e., $F_X(x) = x$ for $0 \leq x \leq 1$, $F_X(x) = 0$ for $x < 0$, and $F_X(x) = 1$ for $x > 1$.

(d) Show that if $X(s) = 2(1 - s)$ then X is a uniform random variable on $[0, 2]$, i.e., $F_X(x) = x/2$ for $0 \leq x \leq 2$, $F_X(x) = 0$ for $x < 0$, and $F_X(x) = 1$ for $x > 2$.