HW11
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. Read the handout 01 and Solve the following problems
in http://cisl.postech.ac.kr/class/eece574/2014s/exam/574_14exam03.pdf
4.

B. Solve the following problems
in http://cisl.postech.ac.kr/lecture/574_2015sp/15exam02v150515a.pdf
7.

C. Solve the following problem.

Problem 4. (15 points) Suppose that we are given a random number generator that outputs independent and identically distributed continuous random variables X_n for $n = 1, 2, \cdots$, with the common probability density function pdf $f_X(x) > 0, \forall x$. We also have a complete knowledge of the pdf $f_Y(y) > 0, \forall y$, of another continuous random variable Y. When we are interested in obtaining an approximate value of $\mathbb{E}\{g(X)\}$ and $\mathbb{E}\{g(Y)\}$ for some continuous and bounded function $g(x)$, answer the following questions.

(a) (5 point) Justify

$$\mathbb{E}\{g(X)\} \approx \frac{\sum_{n=1}^{N} g(X_n)}{N}$$

when N is sufficiently large.

(b) (5 points) Show that

$$\mathbb{E}\left\{\frac{g(X)f_Y(X)}{f_X(X)}\right\} = \mathbb{E}\{g(Y)\}.$$

(c) (5 point) Using the results in (a) and (b), discuss how to obtain an approximate value of $\mathbb{E}\{g(Y)\}$ by using the random number generator for X.