ENGG2430A, Spring 2017, Homework 4

Due at 5pm, Apr 14.

You can put your answer sheets to the Box 10B on the 10th floor of Ho Sin-hang Engineering Building (HSH).

1. (10 points) The random variables X, Y, and Z are independent and uniformly distributed in $[0,1]$. Find the PDF of $X+Y+Z$.

2. (10 points) Suppose that X and Y are random variables with the same variance. Show that $X-Y$ and $X+Y$ are uncorrelated.

3. (10 points) Calculate $\mathbf{E}[X^3]$ and $\mathbf{E}[X^4]$ for a standard normal random variable X.

4. (10 points) At a certain time, the number of people that enter an elevator is a Poisson random variable with parameter λ. The weight of each person is independent of every other person's weight, and is uniformly distributed between 100 and 200 lbs. Let X_i be the fraction of 100 by which the ith person exceeds 100 lbs, e.g., if the 7th person weighs 175 lbs., then $X_7 = 0.75$. Let Y be the sum of the X_i. What's the expectation of Y?
   (hint: use transform of Y.)