**Homework 11** **92.386 203 Prob & Stat I** **Due April 15**

Show all your work. Late Homework will not be accepted without prior approval.

1. Find $E(X)$ and $\mathrm{Var}(X)$ if

   (a) $f_X(x) = \frac{1}{24}x^2$, $x \in \{-2, 2, 4\}$;

   (b) $f_X(x) = \frac{1}{24}x^2$, $x \in (-2, 4)$.

2. The life expectancy of a chip is 4 years.

   (a) What are the expected value and standard deviation of the life of a unit which comes with one chip installed and one replacement chip?
   *Hint.* See Homework 10 Q4 (b).

   (b) Redo (a) if a unit comes with two chips installed and which operates as long as one chip is functional.
   *Hint.* This is the maximum of two exponential variables ... see Homework 8 Q4 (b).

   (c) In a shipment of 200 chips, how many are expected to fail within 5 years?

3. Find the moment generating functions for the random variables of Homework 6.

   (a) $f_X(x) = \frac{1}{21}x$, $x = 1, 2, 3, 4, 5, 6$.

   (b) $f_X(x) = \frac{1}{2}(x+1)$, $|x| < 1$.

Bonus. Find the expected value and variance of the random variable $X$ in Homework 9 Q1.