

## Assignment #13

Due on Friday, October 25, 2013

**Read** Section 4.3 on *Moments* and Section 4.4 on *Variance* in the class lecture notes at <http://pages.pomona.edu/~ajr04747/>

**Read** Section 4.3 on *Variance* and Section 4.4 on *Moments* in DeGroot and Schervish.

**Do** the following problems

1. Compute the moment generating function,  $\psi(t)$ , of a continuous random variable  $X$  with Uniform( $-1, 2$ ) distribution. What should  $\psi(0)$  be? Give also the second moment and variance of  $X$ .

2. Suppose that one word is selected at random from the sentence

THE GIRL PUT ON HER BEAUTIFUL HAT.

If  $X$  denotes the number of letters in the word that is selected, what is the value of  $\text{var}(X)$ ?

3. Suppose that  $X$  is a random variable for which  $E(X) = \mu$  and  $\text{var}(X) = \sigma^2$ . Show that

$$E[X(X - 1)] = \mu(\mu - 1) + \sigma^2.$$

4. Suppose that  $X$  is a random variable for which the mgf is as follows:

$$\psi_X(t) = e^{t^2+3t} \quad \text{for } -\infty < t < \infty.$$

Find the mean and variance of  $X$ .

5. Suppose that  $X$  is a random variable for which the mgf is as follows:

$$\psi_X(t) = \frac{1}{6}(4 + e^t + e^{-t}) \quad \text{for } -\infty < t < \infty.$$

Find the probability distribution of  $X$ .