

HOMEWORK 8
STA320.01, Probability
Fall Semester, 2013

Due: Thurs Nov 14th 2013

- 1 Suppose X is a random variable for which the mgf is as follows:

$$\psi(t) = \exp\{t^2 + 3t\}$$

for $-\infty < t < \infty$. Find the mean and variance of X .

- 2 Suppose X is a discrete random variable for which the mgf is as follows:

$$\psi(t) = \frac{1}{5}e^t + \frac{2}{5}e^{4t} + \frac{2}{5}e^{8t}$$

for $-\infty < t < \infty$. Find the probability function of X .

- 3 For all random variables X and Y , and for all constants a, b, c, d , show that

$$\text{Cov}(aX + b, cY + d) = ac \cdot \text{Cov}(X, Y).$$

- 4 Suppose X, Y, Z are three random variables such that $\text{Var}(X) = 1$, $\text{Var}(Y) = 4$, $\text{Var}(Z) = 8$, $\text{Cov}(X, Y) = 1$, $\text{Cov}(X, Z) = -1$, and $\text{Cov}(Y, Z) = 2$.

Determine

(a) $\text{Var}(X + Y + Z)$

(b) $\text{Var}(3X - Y - 2Z + 1)$.

- 5 Suppose X and Y have a continuous joint distribution for which the joint pdf is as follows:

$$f(x, y) = \begin{cases} \frac{1}{3}(x + y) & \text{for } 0 \leq x \leq 1, 0 \leq y \leq 2 \\ 0 & \text{otherwise.} \end{cases}$$

Determine the value of $\text{Var}(2X - 3Y + 8)$.