HOMEWORK 8

STA5724.01, Probability

Fall Semester, 2008

Due: Friday, November 14th, 2008

1 Suppose that a r.v. X has the following mgf

$$M(t) = (3\exp(t) + \exp(-t))/4 \text{ for } -\infty < t < \infty.$$

Find the mean and variance.

2 Suppose X and Y are iid with the mgf

$$M(t) = \exp(t^2 + 3t) \text{ for } -\infty < t < \infty.$$

Find the mgf for $Z = 2X - 3Y + 4$.

3 Suppose $Cov(X, Z)$ and $Cov(Y, Z)$ exist. Show that

$$Cov(aX + bY + c, Z) = aCov(X, Z) + bCov(Y, Z)$$

where $a, b, c \in \mathbb{R}$ are constant.

4 Suppose that $Var(X) = Var(Y)$ and $Var(X + Y) < \infty$ and $Var(X - Y) < \infty$. Show that $X + Y$ and $X - Y$ are uncorrelated.

5 If the m.g.f. of a r.v. X is $\psi(t) = \exp(t^2)$ for $-\infty < t < \infty$, what is the distribution of X?