

**EEB 596z, Problem Set Four**

**Due Thursday Feb 7 2002**

1 : Suppose  $x_1, x_2,$  and  $x_3$  are multivariate normally distributed with means  $\mu_1 = 1, \mu_2 = 0, \mu_3 = -2,$  and covariance structure

$$\sigma^2(x_1) = 3, \quad \sigma^2(x_2) = 4, \quad \sigma^2(x_3) = 6, \quad \sigma(x_1, x_2) = 1, \quad \sigma(x_1, x_3) = -1, \quad \sigma(x_2, x_3) = 2$$

Finally, define  $y = x_1 - 3x_2 + 4x_3$  and  $z = 3x_1 + 4x_2 - 7x_3.$

- (a) Compute  $\sigma^2(y).$
- (b) Compute  $\sigma^2(z).$
- (c) Compute  $\sigma^2(y, z), \rho(y, z)$
- (d) What is the distribution of  $x_1, x_2$  given  $x_3?$
- (e) What is the regression of  $x_1$  on  $x_2$  and  $x_3?$
- (f) What is the conditional variance of  $x_1$  given  $x_2$  and  $x_3?$