

## Exercise 1 (lab02)

- (i) The inputs to your program should be  $\rho$ ,  $\mu_1$ ,  $\mu_2$ ,  $\sigma_1^2$  and  $\sigma_2^2$ ;
- (ii) Create a vector by name 's' which holds 100 equally spaced values between 0 and 1.
- (iii) Assume two independent random variables  $X, Y$  with means  $\mu_1, \mu_2$  and variances  $\sigma_1^2$  and  $\sigma_2^2$
- (iv) Find the mean and variance of random variable  $Z = sX + (1 - s)Y$ .
- (v) Plot mean and variance of  $Z$  as a function of  $s$ .
- (vi) In the third figure plot mean versus variance.
- (vii) Plot the three figures using subplot.
- (viii) Repeat the same if the correlation coefficient between the two random variables is given by  $\rho$ . Note that variance equals
$$var(Z)(s) = s^2 var(X) + (1 - s)^2 var(Y) + 2s(1 - s)\rho\sqrt{var(X)var(Y)}$$
- (ix) Repeat this for various sets of input parameters. And observe the variations in plots. Can submit a brief (2-3 line) report on your observations.
- (x) Set  $\mu_1 = 1$   $\sigma_1^2 = 0.1$   $\mu_2 = 2$   $\sigma_2^2 = 1$  and  $\rho = -0.2$ . Generate the two sets of subplots (one with independent random variables and the other with  $\rho$  as correlation co-efficient) and submit the same.