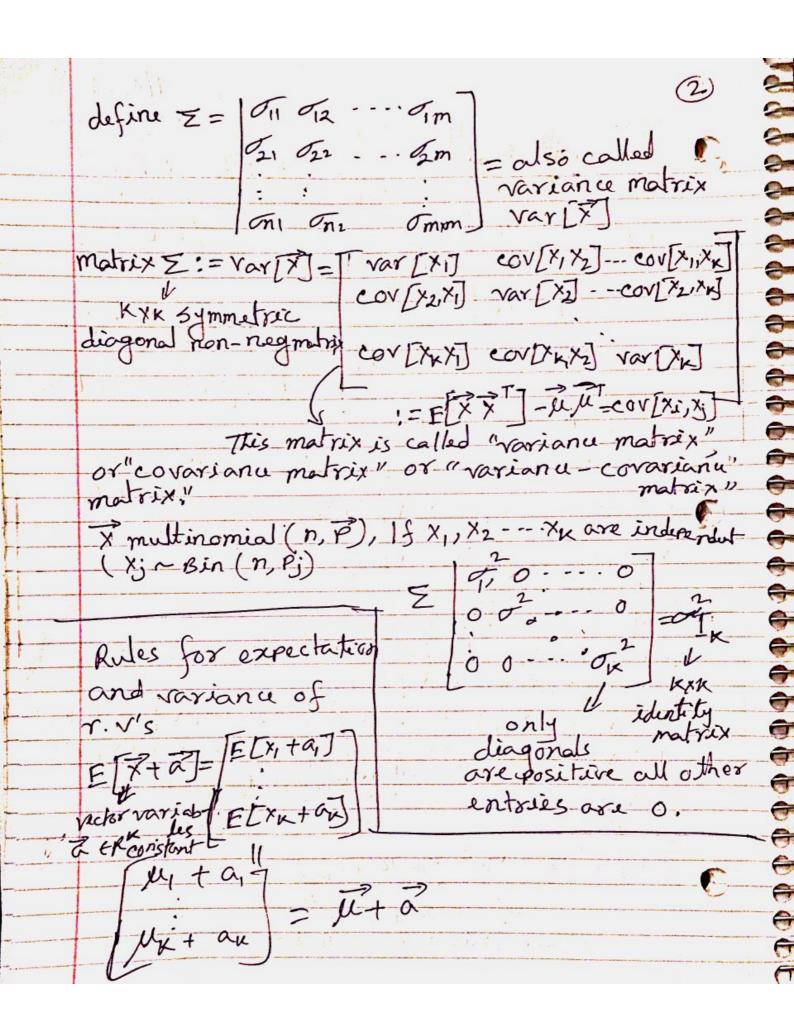
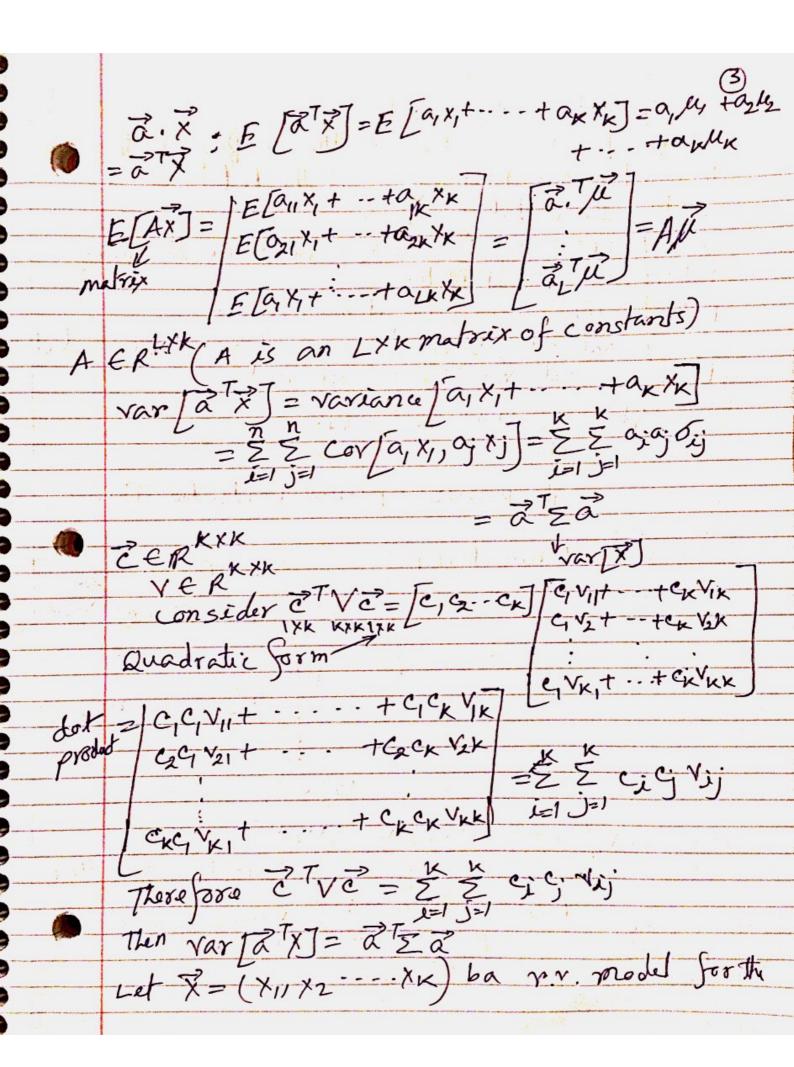
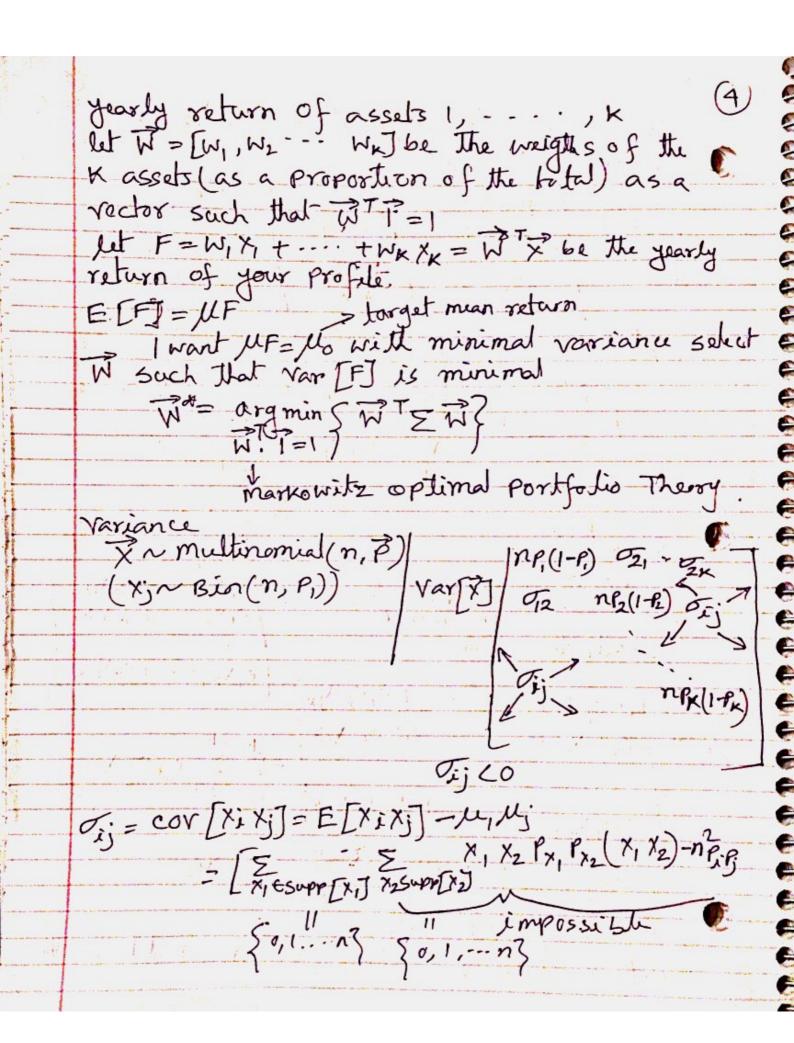
09/11/19 Lecture - 5 Given X~ multinomial (n,P) Xj~ Bin(n,Pj) H;=E[X];=[E[X]] E[X] E[X]  $E[\vec{x}] = \begin{bmatrix} n\rho_1 \\ n\rho_2 \\ \vdots \\ n\rho_n \end{bmatrix} = n\vec{\rho}$  $M = \begin{bmatrix} \chi_{11}, \chi_{12} \cdots \chi_{1m} \end{bmatrix} \quad E[m] = \begin{bmatrix} E[\chi_{11}] \cdots E[\chi_{m}] \\ \vdots \\ E[\chi_{N_1}] \cdots E[\chi_{N_m}] \end{bmatrix}$ Variance: o= var[x] = E[x]-u2 Covariance:  $\sigma_{12} = \text{cov}\left[X_1 X_2\right] = E\left[X_1 X_2\right] - \mu_1 \mu_2$   $\text{Var}\left(X_1 + X_2\right) = \sigma^2 + \sigma_2 + 2\sigma_{12}$   $\text{Var}\left(X_1 + X_2\right) \Rightarrow \sigma_{12}^1 = 0$  $= E[(x_1 - \mu_1)(x_2 - \mu_2)]$ Rules for covariance

(D cov (X, X) = [E[X²] - M²] = Var(X) = 0 Q COV [X1, X2] = COV [X21 X1] (3 COV[X1+X2, X3] = COV[X1, X3] + COV[X2+X3] (a)  $Cov (\alpha_1 x_1, \alpha_2 x_2) = \alpha_1 \alpha_2 \sigma_{12} = \alpha_1 \alpha_2 cov [x_1 x_2]$ (b)  $Var [x_1 + \cdots + x_n] = \sum_{i=1}^{n} \sum_{j=1}^{n} c_{ij}$ (c)  $Var [x_1 + \cdots + x_n] = \sum_{i=1}^{n} \sum_{j=1}^{n} c_{ij}$   $Var [x_1 + \cdots + x_n] = \sum_{i=1}^{n} \sum_{j=1}^{n} c_{ij}$   $Var [x_1 + \cdots + x_n] = \sum_{i=1}^{n} \sum_{j=1}^{n} c_{ij}$ covariance matrix is called I







Re call xi~ Bin(n, Pi) xi = xi+ x2i+-... + xni Where Xii, Xzi, ... . Xni sid Bern (Pi)  $X_j = X_{ij} + X_{2j} + \cdots + X_{nj}$ where Xij, X2j, --- 1 Xnj~Bern(Pg.) When Xi and Xi are dependent

if Xi=1 then Xi must be 0, Xi could be 0 or 1) マ=ス+え+··· +×n Where ブリー・・ズ~ mult(ア) COV[>1xi] = cov[xi+···+ xni, xi+···+ xni] = E E cov[Xii, Xmj] If L = m cov[xii, xmj]=0 Y & COV [Xi, Xi] (2) [X/11, X/4]:=[x+30,13 \*E50,13 Pip] cov [xi, xij] = Pxi xi(1,1) - PxPj =- PiPj impossible to get an apple and a banana at the same time. If In multinomial (n, P) and xi's are identically distributed, 7 = 17 K->00