

Math 314 May 2008 — Homework 1b

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1. Prove that $\text{Cov}(X, Y) = E[XY] - \mu_X \mu_Y$ where $\mu_X = E[X]$ and $\mu_Y = E[Y]$.
2. Use the above result to prove that $V[X] = E[X^2] - \mu_X^2$.
3. Contracts for two construction jobs are randomly assigned to one or more of three firms A , B and C . If Y_1 is the number of contracts assigned to A and Y_2 is the number of contracts assigned to B , find the joint probability distribution $p(y_1, y_2)$.
4. For two random variables Y_1 and Y_2 , if they are independent then $\text{Cov}(Y_1, Y_2) = 0$. The converse is not true. For the following random variables, show that $\text{Cov}(Y_1, Y_2) = 0$ but the random variables are dependent (Hint: $E[Y_1 Y_2] \neq E[Y_1]E[Y_2]$ is a sufficient condition for dependence.)

y_2	y_1		
	-1	0	1
-1	1/16	3/16	1/16
0	3/16	0	3/16
1	1/16	3/16	1/16