Homework 12 **92.386 203 Prob & Stat I** **Due April 22**

Show all your work. Late Homework will not be accepted without prior approval.

1. Let X, Y have joint density $f_{X,Y}(x,y) = 1/3$, $(x,y) \in \{(0,0),(1,1),(1,-1)\}$.
   (a) Find $E(X)$ and $E(Y)$.
   (b) Find $E(X^2)$, $E(Y^2)$ and $E(XY)$.
   (c) Find $\mathrm{Var}(X)$, $\mathrm{Var}(Y)$ and $\mathrm{Cov}(X,Y)$.
   (d) Are X and Y independent? Explain.

2. Let X be the result of a die toss and and Y an exponential random variable with $\lambda = X$.
   (a) Find $E(Y \mid X=2)$ and $\mathrm{Var}(Y \mid X=2)$.
   (b) Find $E(Y \mid X=x)$ and $\mathrm{Var}(Y \mid X=x)$.
   (c) Find $E(Y)$ and $\mathrm{Var}(Y)$. *Hint.* Total Expectation.
   (d) Find $\mathrm{Cov}(X,Y)$.
   (e) Are X and Y independent? Explain.