MATH 262

Section 4.2 Day 29

1. Let X and Y have joint pdf $f(x, y) = 6xy^2$ for $0 \leq x \leq 1$ and $0 \leq y \leq 1$.

   (a) Find the marginal pdfs $f_X(x)$ and $f_Y(y)$.

   (b) Sketch the marginal pdfs $f_X(x)$ and $f_Y(y)$. Just from your sketches, and without doing further calculations, what would you estimate to be the means $E(X)$ and $E(Y)$? *Discuss your estimates with your neighbors:*

   (c) Compute $E(X)$ and $E(Y)$.

   (d) *Discuss with your neighbors:* What are *two* different ways of finding $E(X+Y)$? Compute $E(X+Y)$ in each of these ways.

   (e) *Discuss with your neighbors:* How many ways are there to compute $E(XY)$? Then compute $E(XY)$.

   (f) What are the values of $\text{Cov}(X, Y)$ and $\text{Corr}(X, Y)$?

2. Let X and Y have joint pdf $f(x, y) = 3x + 3y$ for $0 \leq x$, $0 \leq y$, and $x + y \leq 1$.

   (a) Sketch the joint pdf and verify that the volume underneath is 1.

   (b) *Discuss with your neighbors:* What values of X and Y have high probability? What values have low probability?

   (c) Compute the following, using technology to evaluate integrals:
   - $E(X + Y)$
   - $E(XY)$
   - $E(X)$
   - $E(Y)$

   (d) What is $\text{Cov}(X, Y)$?

3. *Discuss with your neighbors:* How do $E(X)$ and $E(Y)$ relate to $E(X + Y)$ and $E(XY)$? Does independence play a role?