MTH 372
Hw 7
Due Thursday, 11/4/2021.

Read Chapters 14,15 of *Huber*.

A. (We began this problem in class on 10/19.) Flip 3 fair coins, A,B,C.
Let X be the total numbers of heads on coins A and B. Let Y be the total number of heads on coins B and C.
(a) Write out the table of the joint pmf $p_{X,Y}(x,y)$.
(b) Compute σ_X^2, σ_Y^2.
(c) Compute $\mathrm{Cov}(X,Y)$ and $\rho_{X,Y}$.

p.99 #14.4 Let Y have pmf $p_Y(i) = \begin{cases} 1/4 & \text{for } i \in \{3,5\} \\ 1/6 & \text{for } i \in \{7,9;11\} \end{cases}$.
(a) Find $E[Y]$.
(b) Find σ_Y .

#14.8 (modified)
Suppose (X,Y) have joint density $f_{X,Y}(x,y) = (2/5)(3x+2y)$ for $(x,y) \in [0,1]^2$
(a) Compute $P(X > .5 \text{ and } Y < .6)$.
(b) Find the marginal pdf's $f_X(x)$ and $f_Y(y)$.
(b) What is $\mathrm{Cov}(X,Y)$?

p.104 #15.1 For $(X,Y) \sim \mathrm{Unif}(\{(0;0);(0;2);(1;2)\})$, find the correlation between X and Y .

#15.2 For (X,Y) with density $f_{X,Y}(x,y) = 2\exp(-x-2y)$ for $x,y \geq 0$, find $\rho_{X,Y}$. (Hint: You can solve this problem without any integration.)

#15.3 (modified) Let $f_{X,Y}(r,s) = \dfrac{1}{C} \cdot \dfrac{r^4+s}{r^2}$ for $r \in [1,3], s \in [0,3]$.
(a) Find the value of C.
(b) Compute $P(X > 2), P(Y > 1)$ and $P(X > 2 \text{ and } Y > 1)$. Are X, Y independent?
(b) Find the density of Y, $f_Y(s)$. .
(c) Find $\rho_{X,Y}$.