Exam 1
March 19, 2024

1. Let the pdf of Y be given by $f_Y(y) = y^2/81$, $-3 < y < 6$. Find the pdf of $U = (Y+3)/9$ and compute $E(U)$.

2. Suppose that Y_1 and Y_2 have the joint pdf

$$f_{Y_1,Y_2}(y_1, y_2) = 2(1 - y_2), \quad 0 < y_1 < 1, \ 0 < y_2 < 1$$

   Find $M_{Y_1}(t)$.

3. Suppose that we have random variables $X_1, \ldots, X_n$ and $Y_1, \ldots, Y_n$. Show that

$$\frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X})(Y_i - \overline{Y}) = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X})Y_i$$