DE13: Week 10

1. Let T_1, T_2 be the first and the second arrival times and W_1, W_2 be the first and the second waiting times.

   (a) For a natural number $n \geq 2$, compute the joint density

   $$f_{T_1,T_2|N(t)}(x, y|N(t) = n).$$

   (b) For a natural number $n \geq 2$, compute the joint density

   $$f_{W_1,W_2|N(t)}(x, y|N(t) = n).$$

   [Hint: Use the Jacobian method.]

   (c) Compute the marginal densities using the joint densities in part (a). In other words, compute

   $$f_{T_1|N(t)}(x|N(t) = n), f_{T_2|N(t)}(y|N(t) = n).$$

   (d) For a natural number $n \geq 2$, compute the conditional density

   $$f_{T_1|T_2,N(t)}(x|T_2 = y, N(t) = n)$$

   Check that the density is a pdf.

   (e) Now compute the expectation

   $$\mathbb{E}(T_1|N(t) = n).$$

2. Problems 36,59,88 from Chapter 5 of Sheldon Ross's book shared on Google Classroom.