**Engineering Mathematics and Statistics (B39AX) Fall 2023**

**Tutorial 7**

**Problem A.**

Let and be to continuous random variables with joint probability density function defined as

where is a constant

1. Are and independent and why?

The support of the couple is a triangle which imposes constraints e.g., on which depends on (). Thus, the variables and are not independent

1. What is the value of ?

Since is a p.d.f, it satisfies .

It follows

Thus, .

1. Compute the marginal probability density function .
2. What is the expression of More generally, to which family of distributions does belong, for what is the distribution?

For , is constant over , thus is a uniform density.

In particular, for , we have and .

**Problem B.**

Let and be to independent continuous random variables with

and .

1. What are the minimum and maximum values of ?
2. Compute the distribution of .

Using the formula to compute the p.d.f. of the sum of two independent RVs, we have

only if , i.e., if .

If , then and thus .

If , then and thus .

If , we obtain

To conclude, we have



1. Draw the graph of the probability density function of

