Project 1: Simulation of the plane boarding strategies
(based on https://www.youtube.com/watch?v=oAHbLRjF0vo)

The project can be done in pairs or individually. The compressed Repast model of the project and the report should be sent to kmiazga@cs.put.poznan.pl until **midnight of 31.12**. The report should contain a brief description of the implementation and the results of the experiments (with a commentary).

- The passengers enter the plane through the entrance at the front of the plane.
- The corridor used by the passengers is made of patches and is one patch wide. There can be at most one passenger on any given patch at any time.
- Each passenger is assigned a specific seat number.
- If the passenger's seat is blocked by other, already seated passengers, these passengers must leave their seats and move to the corridor, towards the end of the plane. We will call such a situation a seat shuffle.
- The passengers returning to their seats after a seat shuffle have the priority over the passengers coming from the direction of the entrance.
- Before taking a seat, each passenger spends a while stowing their bag (the stowing duration should be drawn from the normal distribution https://en.wikipedia.org/wiki/Normal_distribution)
- The passengers board the plane in ordered boarding groups. The order of entering the plane within the group is random.
- Examine the efficiency of a number of different boarding strategies:
    - Random order (just one group)
    - Back to front (each passenger is their own group)
    - Front to back (each passenger is their own group)
    - Back to front (four groups)
    - Front to back (four groups)
    - Window-middle-aisle (three groups)
    - Steffen Perfect
    - Steffen ``Modified''
- Create a plot comparing the probability distribution of boarding times for each of the considered strategies:
    - Using batch runs, perform at least 100 independent simulations for each of the boarding strategies.
    - Use different random seed for each of the simulations.
    - Compute the boarding time for each of the simulations and gather the results obtained for each strategy to their unique files.
    - You can present the results in the form of a histogram (https://en.wikipedia.org/wiki/Histogram)
- Verify the validity of the hypothesis presented in the video. Is it true, that the impact of seat shuffling on the length of the boarding process is lower that the impact of bag

stowing? Compare mean lengths of the boarding process for two different modifications of the model:
    - The passengers do not stow their bags - after reaching their row they immediately attempt to take a seat.
    - The passengers stow their bags, but there are no seat shuffles (notice that this is exactly what happens in the window-middle-aisle strategy)
- Perform the above experiment for two boarding strategies: ``Random order'' and ``Back to front (four groups)''. Use batch runs to estimate how long would the bag stowing need to take for the seat shuffles to cause more delay than the stowing.