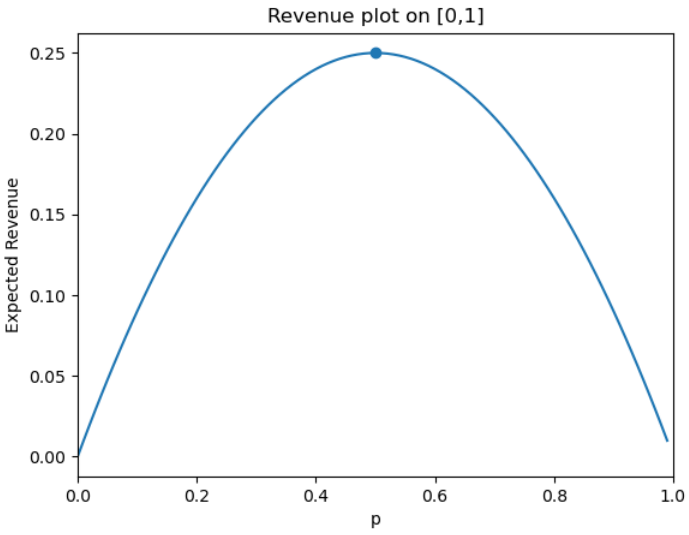
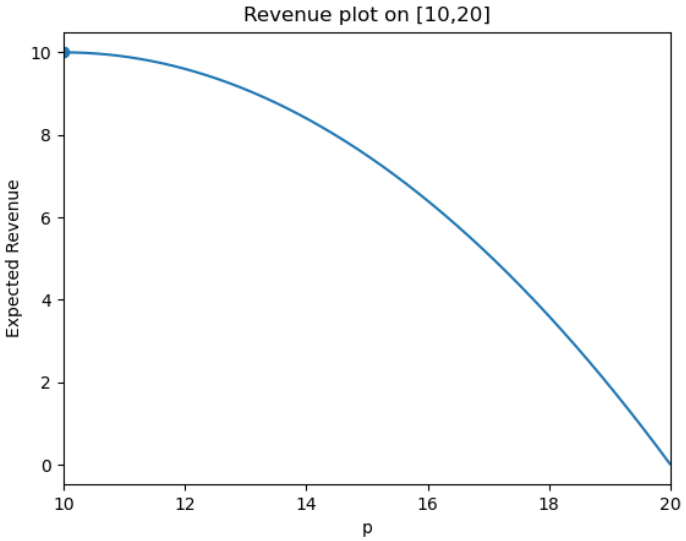
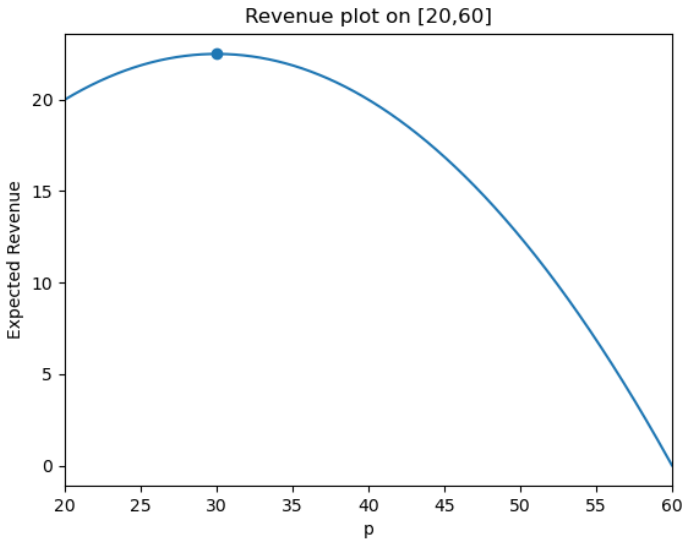
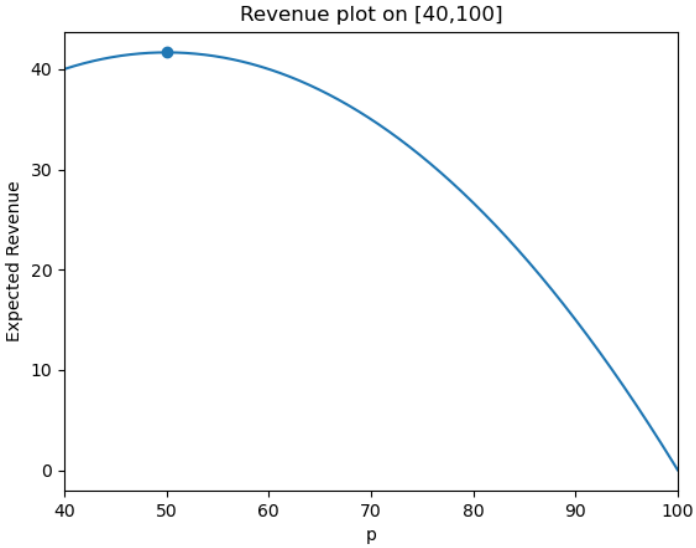
Report Group 21

Question 1b): We created the following plots

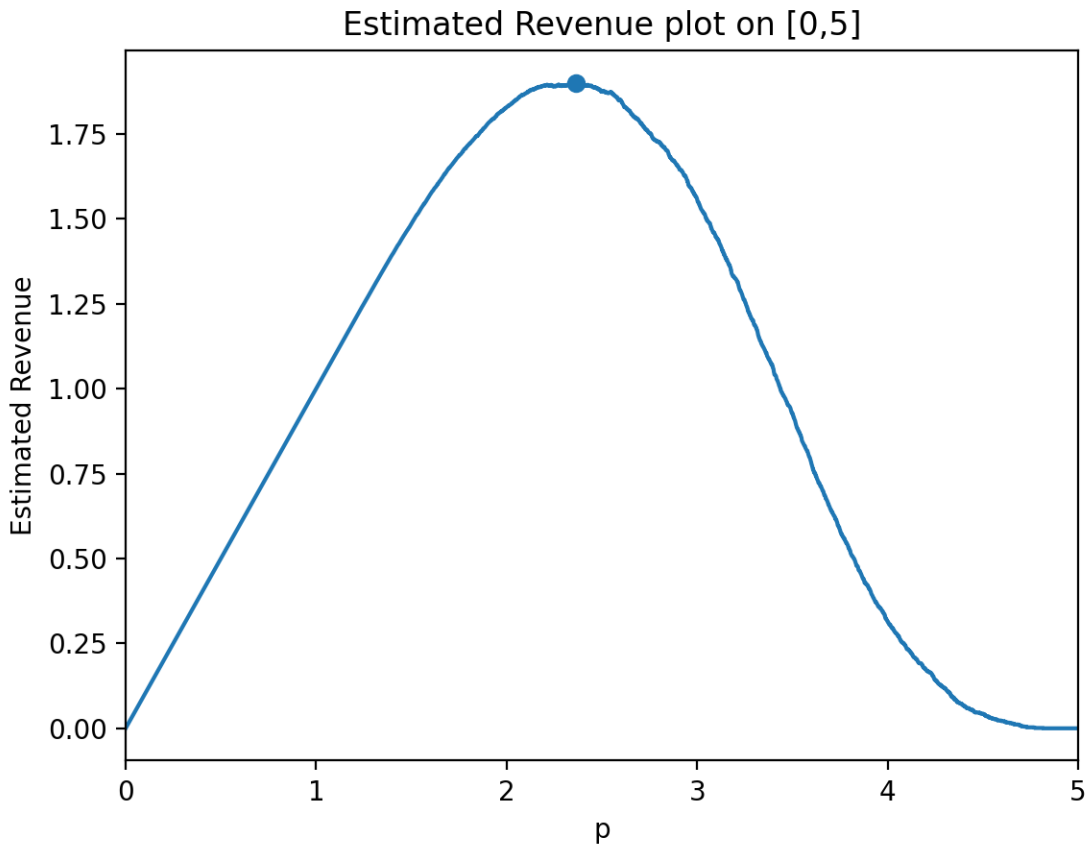








Question 1g): We created the following plot



Question 1h): The matching was created using the following steps:

- For the random matrix V, we first checked every entry and applied the following transformations:
  If the value of V_{ij} is less than or equal to p_i, the value of V_{ij} is set to 0 $\forall j = 1, .., n$
  If the value of V_{ij} is more than p_i, the value of V_{ij} is set to $p_i \ \ \forall j = 1, .., n$
- Since the optimizer will minimize the total cost, we multiply our matrix V with -1 (if I is an instance of particular problem: maximize I ⇔ minimize -I).
- The optimizer returns two arrays corresponding to the row indices and column indices, respectively, of the found matching.
- For each entry of the array with row indices, we take the corresponding entry of the array with the column indices and check whether the corresponding entry of V is unequal to zero:
  If the entry is zero, the row and column indices are not appended to the final array of indices.
  If the entry is not equal to zero, the indices are appended and the value from V is added to the total value of the matching.

How to interpret the output of our matching function:
Example: the output might look like the following:
[array([0], dtype=int64), array([1], dtype=int64), 5]
(notice that the output consists of three elements, 2 arrays and 1 value)

The first array corresponds to the row indices of the final matching. In this case, the final matching consists of 1 element on the first row (index 0).
The second array corresponds to the column indices of the final matching. In this case, the element of the final matching is found in the second column (index 1).
The third element of the output (the value) corresponds to the value of the maximum matching. In this case the matching has a value of 5.
If the arrays would have multiple entries, then the first entry of the first array and the first entry of the second array would correspond to an element of the matching, the second element of the first array and the second element of the second array would correspond to an element of the matching etc.

Who did what:
Each member of our group made every exercise from the assignment (as you suggested). We then compared our code and chose the best one based on the guidelines for 'good coding'. This report was written by Dico de Gier.