Advanced Algorithms
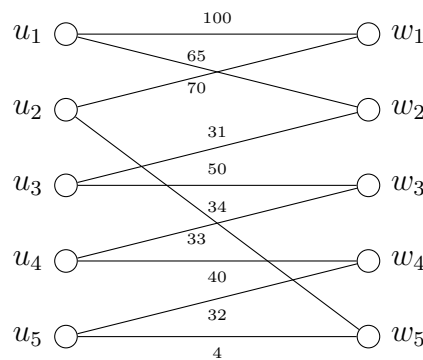## Exercise Sheet 1

Submission: Monday, April 14, 2025, at 11:59 am.
This exercise will be discussed on Wednesday, April 16, 2025.

Exercise 1.1 (Algorithm for maximum weight bipartite matching)   (10 Points)

For the weighted bipartite graph given below and for each $k \in \{1, 2, 3, 4, 5\}$, compute a maximum weight matching M_k of cardinality k.

Exercise 1.2 (Improved running time for maximum weight bipartite matching)   (6 Points)

Prove the following theorem from the lecture:
We can compute a maximum-weight matching in a bipartite graph in time
$O(n' \cdot (|E| + |V| \log(|V|)))$, where n' is the minimum size of a maximum-weight matching.

Exercise 1.3 (Algorithm for the assignment problem)   (4 Points)

Prove the following theorem from the lecture:
We can compute a minimum-weight perfect matching in a bipartite graph in time
$O(|V| \cdot (|E| + |V| \log(|V|)))$.