MATH 581, FALL 2020 – PROBLEM SET 2

Do five of the six problems below. Due Wednesday, October 7.

1. Problem 2.1.96(a) in the book. (Hint 1: Mimic the proof of Lovász Lemma. Hint 2: Problem 1 from HW1 may be helpful.)

2. Prove the following dual to Theorem 1.2:
   If an $X,Y$-bighraph $G$ has a matching covering $X$ and $d(y) \geq k$ for each $y \in Y$, then $G$ has at least $k!$ matchings covering $X$. Find an example with exactly $k!$ matchings distinct from $K_{k,k}$.

3. Problem 2.2.13 in the book.

4. Problem 2.2.18 in the book.

5. Problem 2.2.22 in the book. (Hint: We know how to find shortest paths in graphs with nonnegative edge weights.)

6. Problem 2.2.25 in the book.