MAT109 FALL 2019: PROBLEM SET 7

Due: Wed. 11/20/2019, by 12:00pm

Directions: You can collaborate, but must write up the solutions independently and in a good handwriting. Consulting solutions to problem sets of previous semesters or internet solutions is not allowed.

Problem 1. Solve Part III Problem 3

Problem 2.

(1) Solve Part III Problem 6

(2) Let $A$ and $B$ be finite subsets of $\mathbb{R}$. Assume that for every $a \in A$ there is $b \in B$ with $b \geq a$. Prove that $\max(B) \geq \max(A)$.

Problem 3. Let $A \subset \{1, 2, \ldots, 17\}$ with $|A| = 7$. Use the pigeonhole principle to prove that there are disjoint sets $B, C \subset A$ such that the sum of the elements of $B$ is equal to the sum of the elements of $C$.


Problem 5.

(1) Prove Proposition 12.1.4.

(2) Let $X$ and $Y$ be finite sets and let $B \subset Y$. Prove that the number of functions $f: X \to Y$ with $\text{Im}(f) \subseteq B$ is $|B|^{\|X\|}$. 