

CSC240 Winter 2021 Midterm Assessment Question 5
YOUR NAME and STUDENT NUMBER

5. (10 marks) Recall that, for any set S , $\#S$ denotes the number of elements in S . For any $n \in \mathbb{N}$, let $[n] = \{i \in \mathbb{N} \mid 1 \leq i \leq n\}$.
Give a well-ordering proof that, for all $n \in \mathbb{N}$,

$$\sum_{A \subseteq [n]} \sum_{B \subseteq [n]} \#(A \cup B) = 3n4^{n-1}.$$

Be sure to explicitly define the predicate you are using.
You may use the fact that $\#\{A \mid A \subseteq [n]\} = 2^n$.

Solution:

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