Homework 3

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Q1

Q1, part a

We proceed by induction. First, we consider the set $\mathcal{F}_{x_1}$. We need to show that the size of $\mathcal{F}_{x_1}$ is 2. This follows from the observation that the sets $\{0\}$ and $\{1\}$ are in $\mathcal{F}_{x_1}$.

Now, assume that the size of $\mathcal{F}_{x_1,\ldots,x_n}$ is $n+1$. We want to show that the size of $\mathcal{F}_{x_1,\ldots,x_{n+1}}$ is $n+2$.

Denote the $n+1$ elements of $\mathcal{F}_{x_1,\ldots,x_n}$ by $\{0\ldots0\}$, $\{0\ldots01\}$,$\{0\ldots011\}$, *etc.*

Q1, part b

Q1, part c

Q1, part d

Q1, part e

Q2

Q2, part a

Q2, part b

Q3

Q4

Q5

Q5, part a

Q5, part b