

Subject 24.241. Logic I. Homework due Thursday, November 10.

- I. Symbolize the following sentences, then draw Venn diagrams to represent them:
- Everyone who appears on TV is either rich or famous.
 - No one who appears on TV is rich and famous.
 - Everyone who appears on TV is famous, but not everyone who appears on TC is rich.
 - Conan, who appears on TV, is famous but not rich.
- II. Symbolize the following arguments, then use Venn diagrams to show them valid:
- All bankers are rich.
There are no rich philosophers.
Therefore, no bankers are philosophers.
 - All bankers are rich.
Not every philosopher is rich.
Therefore, there are philosophers who aren't bankers.
 - Descartes was a philosopher who was also a mathematician.
Not all philosophers are clever, but all mathematicians are clever.
Therefore, some philosophers are clever.
- III. Let \mathcal{U} be an interpretation whose domain consists of the fifty US states, and let:
- $\mathcal{U}(\text{"N"}) = \{\text{the six New England states}\} = \{\text{Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island}\}.$
- $\mathcal{U}(\text{"O"}) = \{\text{the thirteen original states}\} = \{\text{Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire}\}.$
- $\mathcal{U}(\text{"m"}) = \text{Massachusetts}.$
- Which states satisfy " $(Nx \wedge \neg Ox)$ " in \mathcal{U} ?
 - Which states satisfy " $\neg (Ox \rightarrow Nx)$ " in \mathcal{U} ?
 - Which states satisfy " $(Nx \wedge \neg Om)$ " in \mathcal{U} ?
 - Which states satisfy " $(\exists x)(Nx \wedge \neg Om)$ " in \mathcal{U} ?
 - Which states satisfy " $(\forall x)((\exists x)(Nm \wedge Ox) \rightarrow (Nx \wedge Om))$ " in \mathcal{U} ?