
I. Symbolize the following sentences, then draw Venn diagrams to represent them:
   a) Everyone who appears on TV is either rich or famous.
   b) No one who appears on TV is rich and famous.
   c) Everyone who appears on TV is famous, but not everyone who appears on TV is rich.
   d) Conan, who appears on TV, is famous but not rich.

II. Symbolize the following arguments, then use Venn diagrams to show them valid:
   a) All bankers are rich.
      There are no rich philosophers.
      Therefore, no bankers are philosophers.
   b) All bankers are rich.
      Not every philosopher is rich.
      Therefore, there are philosophers who aren’t bankers.
   c) 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 $\mathfrak{A}$ be an interpretation whose domain consists of the fifty US states, and let:
    $\mathfrak{A}(“N”) = \{\text{the six New England states}\} = \{\text{Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island}\}.$
    $\mathfrak{A}(“O”) = \{\text{the thirteen original states}\} = \{\text{Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire}\}.$
    $\mathfrak{A}(“m”) = \text{Massachusetts}.$
    a) Which states satisfy “(Nx $\land$ $\neg$ Ox)” in $\mathfrak{A}$?
    b) Which states satisfy “$\neg$ (Ox $\rightarrow$ Nx)” in $\mathfrak{A}$?
    c) Which states satisfy “(Nx $\land$ $\neg$ Om)” in $\mathfrak{A}$?
    d) Which states satisfy “($\exists x)(Nx $\land$ $\neg$ Om)” in $\mathfrak{A}$?
    e) Which states satisfy “($\forall x)(($$\exists x)(Nm $\land$ Ox) $\rightarrow$ (Nx $\land$ Om))” in $\mathfrak{A}$?