Introduction to Semantics: Homework 5
Answer key

The meanings of determiners

Part 1

Where D is the set of doctors, and S is the set of smokers,

(1) No doctor smokes.

is true iff $D \cap S$ is empty;

(2) Every doctor smokes.

is true iff $D \subseteq S$;

(3) Some doctor smokes.

is true iff $D \cap S$ is not empty;

(4) Three doctors smoke.

is true iff $D \cap S$ has three members;

(5) Most doctors smoke.

is true iff $D \cap S$ has more members than $D \cap \{x \in D_e \mid x \notin S\}$, i.e., if more than half of the members in D are also in S; and

(6) Few doctors smoke.

can have at least two meanings: it is either true iff $D \cap S$ is small (let's say less than ten, but this example is a case illustrating sensitivity to context), or iff the proportion of the number of members of $D \cap S$ to the number of members of D is small (let's say, less than twenty percent, but again, there is context sensitivity here). The former meaning gives the "cardinal" reading of *few*, while the latter meaning gives the "proportional" reading.

Part 2

Given these truth conditions for sentences containing quantificational determiners, we can give the following denotations, which assume that quantificational NPs like *no doctor* denote functions taking the meanings of the verb phrases that they syn-

tactically combine with as arguments. *smokes*, for example, denotes an ⟨e, t⟩-type function.

(7) $[\![\textit{no doctor}]\!] = f$: $D_{\langle e, t\rangle} \rightarrow D_t$, such that for any $g \in D_{\langle e, t\rangle}$, $f(g) = 1$ if $D \cap \{x \in D_e \mid g(x) = 1\}$ is empty, and 0 otherwise

(8) $[\![\textit{every doctor}]\!] = f$: $D_{\langle e, t\rangle} \rightarrow D_t$, such that for any $g \in D_{\langle e, t\rangle}$, $f(g) = 1$ if $D \subseteq \{x \in D_e \mid g(x) = 1\}$, and 0 otherwise

(9) $[\![\textit{some doctor}]\!] = f$: $D_{\langle e, t\rangle} \rightarrow D_t$, such that for any $g \in D_{\langle e, t\rangle}$, $f(g) = 1$ if $D \cap \{x \in D_e \mid g(x) = 1\}$ is not empty, and 0 otherwise