Review Guide: Chapter 3

Quantified Statements

- What is a predicate? *(p. 97)*
- What is the truth set of a predicate? *(p. 97)*
- What is a universal statement, and what is required for such a statement to be true? *(p. 98)*
- What is the method of exhaustion? *(p. 99)*
- What is required for a universal statement to be false? *(p. 98)*
- What is an existential statement, and what is required for such a statement to be true? *(p. 99)*
- What is required for a existential statement to be false? *(p. 99)*
- What are some ways to translate quantified statements from formal to informal language? *(p. 100)*
- What are some ways to translate quantified statements from informal to formal language? *(p. 101)*
- What is a universal conditional statement? *(p. 101)*
- What are equivalent ways to write a universal conditional statements? *(pp. 101-103)*
- What are equivalent ways to write existential statements? *(p. 103)*
- What is a trailing quantifier? *(p. 101)*
- What does it mean for a statement to be quantified implicitly? *(p. 103)*
- What do the notations $\Rightarrow$ and $\Leftrightarrow$ mean? *(p. 104)*
- What is the relation among $\forall$, $\exists$, $\wedge$, and $\vee$? *(p. 112)*
- What does it mean for a universal statement to be vacuously true? *(p. 112)*
- What is the rule for interpreting a statement that contains both a universal and an existential quantifier? *(pp. 118-119)*
- How are statements expressed in the computer programming language Prolog? *(pp. 127-128)*

Negations: What are negations for the following forms of statements?

- $\forall x$, $Q(x)$ *(p. 109)*
- $\exists x$ such that $Q(x)$ *(p. 109)*
- $\forall x$, if $P(x)$ then $Q(x)$ *(p. 111)*
- $\forall x$, $\exists y$ such that $P(x, y)$ *(p. 123)*
- $\exists x$ such that $\forall y$, $P(x, y)$ *(p. 123)*

Variants of Conditional Statements

- What are the converse, inverse, and contrapositive of a statement of the form "$\forall x$, if $P(x)$ then $Q(x)$"? *(p. 113)*
- How are quantified statements involving necessary and sufficient conditions and the phrase only-if translated into if-then form? *(pp. 114-115)*

Validity and Invalidity

- What is universal instantiation? *(p. 132)*
- What are the universal versions of modus ponens, modus tollens, converse error, and inverse error, and which of these forms of argument are valid and which are invalid? *(pp. 133-135)*
- How is universal modus ponens used in a proof? *(p. 134)*
- How can diagrams be used to test the validity of an argument with quantified statements? *(pp. 136-139)*