LINGO – SYNTAX

1. In general, an optimization model will consist of the following three items:

¨**Objective Function** - The objective function is a formula that expresses exactly what it is you want to optimize. In business oriented models, this will usually be a profit function you wish to maximize, or a cost function you want to minimize. Models may have, at most, one objective function.

¨**Variables** - Variables are the quantities you have under your control. You must decide what the best values of the variables are. For this reason, variables are sometimes also called decision variables. The goal of optimization is to find the values of a model's variables that generate the best value for the objective function, subject to any limiting conditions placed on the variables.

¨**Constraints** - Almost without exception there will be some limit on the values the variables in a model can assume at least one resource will be limited (e.g., time, raw materials, your department's budget, etc.). These limits are expressed in terms of formulas that are a function of the model's variables. These formulas are referred to as constraints because they constrain the values the variables can take.

2. The objective function must always be at the start of the model and is initiated with either **MAX=** (for maximize) or **MIN=** (for minimize)

3. When constructing **variable names** in LINGO, **all names must begin with an alphabetic character (A-Z). Subsequent characters may be either alphabetic, numeric (0-9), or the underscore (_). Names may be up to 32 characters in length.**

4. In every function of the model (objective function and model constraints) the **product** is indicated usign the symbol ***** between the constant and the variable name

5. **Each line in LINGO is terminated with a semicolon (;)**. These semicolons are required. Your model will not solve without them.

6. Since most computers do not have less than or equal to keys (≤), LINGO has adopted the convention of using the two character symbol <= to denote ≤. **As an alternative, you may simply enter < to signify less than or equal to. In a similar manner, >= or > are used to signify greater than or equal to (≥)**.

7. An expression may be broken up into as many lines as you want, but the expression must be terminated with a semicolon.

8. **Comments begin with an exclamation point (!) and end with a semicolon (;).** All text between an exclamation point and terminating semicolon are ignored by LINGO. Comments can occupy more than one line, and can share lines with other LINGO expressions.

9. This is not a requirement. **LINGO does not distinguish between uppercase and lowercase in variable names**.

10. Finally, you may optionally **name constraints** in a model. Constraints names make many of LINGO's output reports easier to interpret. Constraints names must follow the same

conventions as variable names. To name a constraint you must enclose it in brackets: **[**constraint_name**]**.

11. Variables are permitted on the right-hand side of a constraint equation.

12. Variable Domains

VAR. DOMAINS	
@GIN (var)	**restricts a variable to being an integer value**
@BIN (var)	**makes a variable binary (i.e., 0 or 1),**
@FREE (var)	**allows a variable to assume any real value, positive or negative**
@BND (lower, var, upper)	**limits a variable to fall within a finite range**