On the slide, the symbol lambdus (phonetic) of J is a variable representing the number of units of activity J to be performed. The large sigma in that second expression there means what it usually does; it means the sum of the quantity shown taking over all possible values of J; in this case, over all types of activity. The relations shown are called linear, since no lambdas are multiplied together or appear in powers higher than the first. Basically, there are three kinds of conditions involved in the linear programming problem. First, a negative number of units of an activity cannot be performed. This is represented by that first expression.

Second, allocations are subject to certain practical constraints. Third, there is a linear function of the variables, called the objective, which we wish to optimize. To give you a better feel for the kind of problems solved by linear programming, I'd like to show three classical examples. The first is the simple production problem. In this problem a producer has available limited amounts of several types of resources. Specifically, he has these sub-I units of resource I where I takes a different value for each type of resource.

The producer can make a number of different kinds of commodities using these resources, and he wishes to know how many units of each kind of commodity he should make to maximize his total monetary return. On the slide, the little A sub-I J represents the number of units of resource I required to produce one unit of commodity J. C sub-J is the return per unit of commodity J, and lambdus of J is the number of units that commodity J produced. The constraints are obvious. The producer can't produce a negative number of commodity units, and he can't use more resources than he has available. The problem, then, is to solve for those lambdas of J that maximize the objective; the objective being that bottom equation down there.