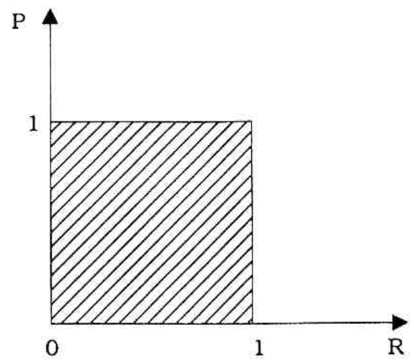


**Figure 10.2**
The square representing all possible pairs of $R$ and $P$.

Different approaches may be used to determine the domains of objects for which a complex search characteristic is applicable. In our view a fruitful approach can be based on the following (relatively weak) assumption. Whether the obtained output belongs to the domain under consideration is a question that can be resolved correctly and in full by an analysis of the recall and precision levels achieved in obtaining this particular output.

It follows from this assumption that any two outputs with the same corresponding levels of recall and precision ($R^1 = R^2$ and $P^1 = P^2$) can be regarded as equivalent from the point of view of their membership in the domain of objects for which the complex search characteristic is applicable. This assumption also allows one to describe this domain in the following way. We introduce a coordinate system with recall marked up on the abscissa and precision on the ordinate axis. Then all the value pairs of recall and precision levels achievable in document search are represented by the points in the square delimited by straight lines: $R = 0$, $R = 1$, $P = 0$, and $P = 1$ (Figure 10.2).

This assumption implies that for every point of the square and any complex search characteristic $F$, the question can be resolved as to whether $F$ will allow a pragmatically justified evaluation of the functional effectiveness of a document search that has resulted in the recall and precision levels corresponding to the coordinates of the given point. It means that a set of all points can be identified within the square where a positive resolution will be found for the question under discussion. We will denote this set by $M_F$. Then the domain of objects for which the complex search characteristic $F$ is applicable is a set of all outputs whose recall and precision levels correspond to the coordinates of some point in $M_F$. This $M_F$ set we will call the *domain of applicability of the complex search characteristic F.* Clearly, by defining the limits of $M_F$ we will define the limits of the domain of objects for which characteristic $F$ is applicable.



It would seem from the preceding discussion that one always has to determine the recall and precision levels of the search achieved in the particular situation in order to find out on the basis of the CSC applicability domain whether the formal method of functional effectiveness evaluation can be used in a given situation. Indeed, an overwhelming majority of the known CSCs presupposes such determination. In this, while the precision determination causes no difficulties, it is known that recall cannot be determined by the search results alone. This is a source of some inconvenience in deciding whether the formal method can be applied to evaluate functional effectiveness. To resolve the latter, however, one can use the recall value that is found with the help of information science methods (we will focus on this subject later). Besides, complex search characteristics exist today that make it possible to solve the question under consideration without defining the achieved recall level. Note that the use of such a CSC was demonstrated in Chapter 9. Later on we will describe this possibility in greater detail.

It should be noted that domains of applicability may turn out to be different for different CSCs. It seems that a CSC with very narrow domain of applicability should not be used for evaluating search functional effectiveness. Based on the notion of "domain of applicability," it will be helpful to attempt to formally separate the complex search characteristic that it seems expedient to use from the CSCs whose use is not expedient. Such an attempt, for example, may be based on the following assumption.

Use of a complex search characteristic to evaluate the functional effectiveness of a document search can be considered expedient if and only if the domain of applicability of this characteristic includes a square bounded by straight lines—$R = 0.5$, $R = 1$, $P = 0.5$, $P = 1$—which we will call the determining square (Figure 10.3).

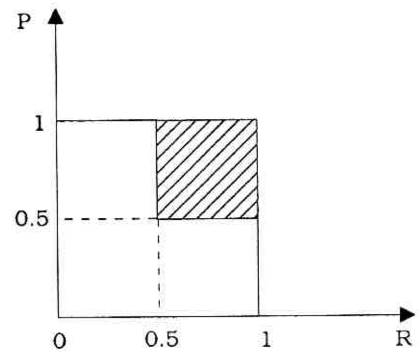


**Figure 10.3**
Determining square.