Given a group of people and a set of alternatives on which the people have opinions.

We suppose each individual has a *preference ranking* on the set of alternatives.

A set of individual preference rankings is called a *group preference schedule*.

Given a group preference schedule, one goal will be to construct a *group preference ranking* if possible.

We will assume that individual preferences are *transitive*, and we will require that group preferences be transitive.

We will ignore the strength of preferences.

We require that individual preferences are well defined. (We ignore indifference.)

Example 1: **We have a group of three people A, B, C and a set of three alternatives X, Y, Z. Suppose the individual preference rankings are as follows:**

	A	B	C
1st	X	Y	Z
2nd	Y	Z	X
3rd	Z	X	Y

Here A prefers X to Y to Z. We denote this by X > Y > Z.

Our initial approach will be to try *pairwise comparisons* selecting the preferred alternative of a pair by simple majority vote. If this leads to a transitive group preference ranking, then we call the one at the top of the group list the *most preferred alternative*.

	A	B	C
1st	X	Y	Z
2nd	Y	Z	X
3rd	Z	X	Y

Making the pairwise comparisons it looks like the group preferences should be X > Y > Z > X. As noted above, we will consider this non-transitive, or cyclic, behavior unacceptable.

Example 2: **The individual preference rankings are as follows.**

	A	B	C
1st	X	Y	Z
2nd	Y	Z	Y
3rd	Z	X	X

Employing pairwise comparisons we have a group preference ranking Y > Z > X but no majority winner.

Example 3: **We now consider a sequential voting scheme where a most preferred alternative is to first determined by first selecting between any two alternatives and then selecting between the winner of the first step and a third alternative, and so on. What happens when we apply this sequential voting approach to the preference rankings in Example 1.**

Our next approach will be to assigning points to votes on the basis of their relative rankings and determining a group preference ranking by adding the points assigned to each alternative by all the individuals.

Example 4:

Points	A	B	C
4	X	Y	W
3	Y	Z	X
2	Z	W	Y
1	W	X	Z

Alternative	Sum of Points
X	
Y	
Z	
W	

We have a group preference ranking of Y > X >W > Z.

Example 5: **Apply the method of Example 4 to the following preference rankings.**

A	B	C	D	E	F	G
X	Y	W	X	W	Y	W
Y	Z	X	Y	X	Z	X
Z	W	Y	Z	Y	W	Y
W	X	Z	W	Z	X	Z

A	B	C	D	E	F	G
X	Y	W	X	W	Y	W
Y	W	X	Y	X	W	X
W	X	Y	W	Y	X	Y

Summary of Desired Properties of a Group Preference Ranking

1. **The decision rule must produce a transitive group preference ranking.**

2. **If alternative X is preferred to alternative Y by every member of the group, then the decision process produces a group preference ranking in which X is preferred to Y.**

3. **Let V be a subset of alternatives. The decision process should determine a group preference ranking in which the relative rankings of the alternatives in V depends only on the relative ranking of those alternatives by the individuals.**

4. **There is no individual *I* such that for every preference schedule, the decision process yields a group preference ranking that is the same as *I*'s.**

Example 6: **Apply the method of Example 4 to the following preference rankings.**

A	B	C	D	E
X	X	Y	Z	W
Z	Y	X	W	X
Y	Z	W	X	Y
W	W	Z	Y	Z

A	B	C	D	E
Z	X	Y	W	W
X	W	X	Z	Y
Y	Y	W	Y	Z
W	Z	Z	X	X

Compare the relative rankings of X and W.