

Method of Pairwise Comparisons:

Compares each candidate head-to-head and then assigns points.
1 - win, $\frac{1}{2}$ - tie, 0 - loss. Points tallied after all comparisons done.
Winner is candidate with the most points.

Number of Pairwise Comparisons:

4 choices \rightarrow 6 comparisons

$$\frac{(N-1)N}{2}$$

5 choices \rightarrow 10 comparisons.

Independence-of-Irrelevant-Alternatives Criterion:

If candidate X is a winner of an election and in a recount one of the nonwinning candidates withdraws, X should still be the winner.

The 220 members of the Drama Club are voting on the play they will present this year. The 5 choices are Romeo and Juliet (R), Julius Caesar (J), Macbeth (M), Hamlet (H), and the Taming of the Shrew (T). The members rank their choices, summarized in the preference table.

Number of Voters	50	50	40	30	30	20
1 st Choice	T	R	T	J	J	H
2 nd Choice	M	M	H	H	M	R
3 rd Choice	H	J	M	M	R	T
4 th Choice	J	H	R	R	T	M
5 th Choice	R	T	J	T	H	J

1. Determine which play is selected using the pairwise comparison method.

R vs. J : 110 to 110 \rightarrow $\frac{1}{2}$ pt. J
 $\frac{1}{2}$ pt. R

R vs. M : 70 to 150 \rightarrow 1 pt M

R vs. H : 80 to 140 \rightarrow 1 pt H

R vs. T : 130 to 90 \rightarrow 1 pt R

J vs. M : 60 to 160 \rightarrow 1 pt M

J vs. H : 110 to 110 \rightarrow $\frac{1}{2}$ pt J
 $\frac{1}{2}$ pt H

J vs. T : 110 to 110 \rightarrow $\frac{1}{2}$ pt J
 $\frac{1}{2}$ pt T

M vs. H : 130 to 90 \rightarrow 1 pt M

M vs. T : 110 to 110 \rightarrow $\frac{1}{2}$ pt M
 $\frac{1}{2}$ pt T

H vs. T : 100 to 120 \rightarrow 1 pt T

R - 1.5 pts

J - 1.5 pts.

M - 3.5 pts.

H - 1.5 pts.

T - 2 pts.

Macbeth is the winner!

An election with five candidates (A, B, C, D, and E) is decided using the method of pairwise comparisons. Suppose that A loses three pairwise comparisons, B loses one, and D loses one and ties one, and E loses two and ties one.

2. How many points did each candidate get? (Remember, one point for a win, half a point for a tie.)

A - 1

B - 3

C - 2

D - 2.5

E - 1.5

- each candidate has 4 comparisons

- total points = 10

3. Who was the winner of the election?

B with 3 points.