# VOTING METHODS & THEIR FLAWS [PIRNOT 11.1 & 11.2]

**EX 11.2.1:** Given the following preferences table for candidates A,B,C:

| | 12 | 14 | 12 | 13 | 4 |
|---|---|---|---|---|---|
| $1^{st}$ | $A$ | $A$ | $B$ | $B$ | $C$ |
| $2^{nd}$ | $B$ | $C$ | $A$ | $C$ | $B$ |
| $3^{rd}$ | $C$ | $B$ | $C$ | $A$ | $A$ |

(a) Find the winner using the Plurality Method.

(b) Find the Condorcet (head-to-head) winner.

| $A$ vs $B$ | 12 | 14 | 12 | 13 | 4 |
|---|---|---|---|---|---|
| $1^{st}$ | | | | | |
| $2^{nd}$ | | | | | |

$\Longrightarrow$ # votes for $A =$ <br> # votes for $B =$ $\Longrightarrow$ Winner is

| $A$ vs $C$ | 12 | 14 | 12 | 13 | 4 |
|---|---|---|---|---|---|
| $1^{st}$ | | | | | |
| $2^{nd}$ | | | | | |

$\Longrightarrow$ # votes for $A =$ <br> # votes for $C =$ $\Longrightarrow$ Winner is

| $B$ vs $C$ | 12 | 14 | 12 | 13 | 4 |
|---|---|---|---|---|---|
| $1^{st}$ | | | | | |
| $2^{nd}$ | | | | | |

$\Longrightarrow$ # votes for $B =$ <br> # votes for $C =$ $\Longrightarrow$ Winner is

Therefore, the Condorcet winner is

(c) Find the winner using the Plurality Method if candidate C drops out of the race.

| $C$ is dropped | 12 | 14 | 12 | 13 | 4 |
|---|---|---|---|---|---|
| $1^{st}$ | | | | | |
| $2^{nd}$ | | | | | |

$\Longrightarrow$ # votes for $A =$ <br> # votes for $B =$ $\Longrightarrow$ Plurality winner is

(d) Explain in one sentence why the Plurality Method violates the Condorcet Criterion.

(e) Explain in one sentence why the Plurality Method violates the IIA Criterion.

**EX 11.2.2:** Given the following preferences table for candidates A,B,C,D,E:

| | 15 | 6 | 6 | 6 |
|---|---|---|---|---|
| $1^{st}/$ | $A/$ | $B/$ | $C/$ | $E/$ |
| $2^{nd}/$ | $D/$ | $D/$ | $B/$ | $B/$ |
| $3^{rd}/$ | $C/$ | $A/$ | $A/$ | $A/$ |
| $4^{th}/$ | $E/$ | $C/$ | $E/$ | $D/$ |
| $5^{th}/$ | $B/$ | $E/$ | $D/$ | $C/$ |

(a) Find the winner using the Borda Count Method (first fill in the space after the slash in each entry of above table).

(b) Find the winner using the Borda Count Method if candidates C,D,E drop out of the race.

| $C, D, E$ are dropped | 15 | 6 | 6 | 6 |
|---|---|---|---|---|
| $1^{st}/$ | / | / | / | / |
| $2^{nd}/$ | / | / | / | / |

(c) Explain in one sentence why the Borda Count Method violates the IIA Criterion.

**EX 11.2.3:** Given the following preferences table for candidates A,B,C,D:

| | 30 | 25 | 22 | 20 | 11 |
|---|---|---|---|---|---|
| $1^{st}$ | $D$ | $A$ | $B$ | $C$ | $C$ |
| $2^{nd}$ | $A$ | $C$ | $C$ | $B$ | $B$ |
| $3^{rd}$ | $B$ | $B$ | $A$ | $D$ | $A$ |
| $4^{th}$ | $C$ | $D$ | $D$ | $A$ | $D$ |

Find the winner using the Plurality with Elimination Method.

**EX 11.2.4:** Given the following preferences table for candidates A,B,C:

| | 2 | 4 | 2 | 1 | 2 | 1 |
|---|---|---|---|---|---|---|
| $1^{st}$ | $A$ | $A$ | $B$ | $B$ | $C$ | $C$ |
| $2^{nd}$ | $B$ | $C$ | $A$ | $C$ | $A$ | $B$ |
| $3^{rd}$ | $C$ | $B$ | $C$ | $A$ | $B$ | $A$ |

Find the winner using the Pairwise Comparisons Method.

| $A$ vs $B$ | 2 | 4 | 2 | 1 | 2 | 1 |
|---|---|---|---|---|---|---|
| $1^{st}$ | | | | | | |
| $2^{nd}$ | | | | | | |

$\Longrightarrow$ # votes for $A =$ <br> # votes for $B =$ $\Longrightarrow$ Winner is

| $A$ vs $C$ | 2 | 4 | 2 | 1 | 2 | 1 |
|---|---|---|---|---|---|---|
| $1^{st}$ | | | | | | |
| $2^{nd}$ | | | | | | |

$\Longrightarrow$ # votes for $A =$ <br> # votes for $C =$ $\Longrightarrow$ Winner is

| $B$ vs $C$ | 2 | 4 | 2 | 1 | 2 | 1 |
|---|---|---|---|---|---|---|
| $1^{st}$ | | | | | | |
| $2^{nd}$ | | | | | | |

$\Longrightarrow$ # votes for $B =$ <br> # votes for $C =$ $\Longrightarrow$ Winner is

| **CANDIDATE** | **POINTS** | $\frac{1}{2}$**-POINTS** |
|---|---|---|
| A | | |
| B | | |
| C | | |