PRINT your Name: Solution

Nine 10-year-old boys were asked to rank their favorite T.V. shows. Three kids liked *The Happy Bunny Mayhem Hour* best, with *Dragonball Z* second, followed by *Ed, Edd, and Eddie*, and then *Rabid Ninjas* last. One child ranked had *The Happy Bunny Mayhem Hour* first, followed by *Rabid Ninjas, Ed, Edd, and Eddie*, and then *The Happy Bunny Mayhem Hour*. Three other kids ordered the shows as *Rabid Ninjas, Dragonball Z, Ed, Edd, and Eddie*, and then *The Happy Bunny Mayhem Hour*. The two remaining children ranked the shows *Dragonball Z, The Happy Bunny Mayhem Hour, Ed, Edd, and Eddie*, and finally *Rabid Ninjas*.

The results are summarized in the table below:

	3	1	3	2
The Happy Bunny Mayhem Hour	1	1	4	2
Dragonball Z	2	4	2	1
Ed, Edd, and Eddie	3	3	3	3
Rabid Ninjas	4	2	1	4

1. Which show would win in a plurality election? (circle your answer)

<u>*The Happy Bunny Mayhem Hour*</u>   *Dragonball Z*   *Ed, Edd, and Eddie*   *Rabid Ninjas*

Solution: The *Happy Bunny Mayhem Hour* is the plurality winner, since it is the choice of 4 voters. The second place winner is *Rabid Ninjas*, prefered by 3 boys, and *Dragonball Z* comes in third with the remaining 2 voters. No one took *Ed, Edd, and Eddie* as their first choice.

2. Which show has the highest Borda count?

The Happy Bunny Mayhem Hour   <u>*Dragonball Z*</u>   *Ed, Edd, and Eddie*   *Rabid Ninjas*

Solution: Below are the calculations. Remember that we give 4 points for a first-place vote, 3 points for a second-place, 2 for a third, and 1 for a last-place showing.

$$\textit{Happy Bunny Mayhem Hour}: \quad (3+1)\cdot 4 + 2\cdot 3 + 0\cdot 2 + 3\cdot 1 = 25$$
$$\textit{Dragonball Z}: \quad 2\cdot 4 + (3+3)\cdot 3 + 0\cdot 2 + 1\cdot 1 = 27$$
$$\textit{Ed, Edd, and Eddie}: \quad 0\cdot 4 + 0\cdot 3 + (3+3+3+3)\cdot 2 + 0\cdot 1 = 18$$
$$\textit{Rabid Ninjas}: \quad 3\cdot 4 + 1\cdot 3 + 0\cdot 2 + (3+2)\cdot 1 = 20$$

So *Dragonball Z* has the highest Borda count, with 27.

3. Which show, if any, is the Condorcet winner?

The Happy Bunny Mayhem Hour   <u>*Dragonball Z*</u>   *Ed, Edd, and Eddie*   *Rabid Ninjas*

No Condorcet winner.

Solution: My first guess is that it would either be the bunnies (the plurality winner) or Dragonball. Let's see who wins in the head-to-head with those two:

The Happy Bunny Mayhem Hour gets only four votes (from the first two columns). The remaining five voters prefer *Dragonball Z*. So clearly the happy bunnies can't be our Condorcet winner. Perhaps it is DBZ.

Now lets consider DBZ against the Eds: Here, all except one voter prefer *Dragonball Z*– this voter is the one who ranked *Dragonball Z* in 4th place. So again, DBZ wins.

Finally, we should must compare DBZ to the *Rabid Ninjas*, and again it wins, this time with another close 5 to 4 race (the outer two columns prefer DBZ, the inner two like the ninjas.)

Since it beat all the other candidates in a one-on-one race, *Dragonball Z* is the Condorcet winner.

There is no need to check the three other possible contests.