## At-Large Voting

If each voter casts as many votes as candidates are elected, a majority can elect all their candidates, and the minority will elect none. E. g., if there are 891 voters with 9 votes each and 9 candidates are elected, a majority of 446 voters can give 446 votes to each of 9 candidates, and the minority of 445 will elect none since there are only 445 of them to give votes to a candidate.

100 voters, 1 vote per voter, 9 candidates elected

$$
\begin{array}{llllllllll}
10 & 10 & 10 & 10 & 10 & 10 & 10 & 10 & 10 & 10 \\
10 & 11 & 9 & 10 & 10 & 10 & 10 & 10 & 10 & 10
\end{array}
$$

891 voters, 1 vote per voter, 9 candidates elected
89.189 .189 .189 .189 .189 .189 .189 .189 .189 .1 90898989898989898989

6 votes per voter

$$
\begin{aligned}
& 390>501 \times \frac{6}{8}=375.75 \\
& 390<501 \times \frac{6}{7}=429.43 \\
& 501 \times \frac{6}{7}=429.43>390 \\
& 501 \times \frac{6}{8}=375.75<390 \\
& \begin{aligned}
& x>(891-x) \times \frac{6}{9} \Rightarrow x>356.4 \\
& x \quad>(891-x) \times \frac{6}{8} \Rightarrow x>381.86 \\
& x>(891-x) \times \frac{6}{7} \Rightarrow x>411.23 \\
& x>(891-x) \Rightarrow x>445.5 \\
& x>(891-x) \Rightarrow x>445.5 \\
& x>(891-x) \Rightarrow x>445.5 \\
& x \times \frac{6}{7}>(891-x) \Rightarrow x>479.77 \\
& x \times \frac{6}{8}>(891-x) \Rightarrow x>509.14 \\
& x \times \frac{6}{9}>(891-x) \Rightarrow x>534.6
\end{aligned}
\end{aligned}
$$

$$
\begin{array}{cccccccc}
A & B & C & D & E & F & G & H \\
x & x & x & x & x & x & & \\
y & y & y & y & & & y & y \\
z & z & & & z & z & z & z \\
& & w & w & w & w & w & w
\end{array}
$$

891 voters, 9 candidates elected
Procedure
9 districts

| you draw | $50 / 891$ | $250 / 891$ | $450 / 891$ |
| :--- | :--- | :--- | :--- |
| they draw | $442 / 891$ | $642 / 891$ | $842 / 891$ |

at-large voting
1 vote
90/891
447/891
803/891
6 votes
357/891
446/891(wins 6) 535/891
9 votes
446/891(wins 9) 446/891(wins 9) 446/891


Figure 1: 891 voters, 390 favor your candidate, opposition draws districts


Figure 2: 891 voters, 390 favor your candidate, you draw districts


Figure 3: 891 voters, 501 favor your candidate, opposition draws districts


Figure 4: 891 voters, 501 favor your candidate, you draw districts

