FIFA World Cup Host Countries

Activity: Since the first World Cup in 1930, countries have contended for the honor of hosting the tournament. Given the great disparity in travel distance for teams depending on the location, fair allocation of sites is necessary. After early boycotts because of the choice of location, FIFA typically alternated the sites yearly between Europe and North and South America.
A 20 December 2018 ranking of the top world soccer national teams is as follows:[1]

1. Belgium	11. Argentina	21. Peru	31. Venezuela	41. Australia
2. France	12. Columbia	22. Austria	32. Paraguay	42. Czech Rep.
3. Brazil	13. Chile	23. Senegal	33. Rep. of Ireland	43. Greece
4. Croatia	14. Sweden	24. Romania	34. Bosnia and Herzegovina	44. Nigeria
5. England	15. Netherlands	25. USA	35. N. Ireland	45. Montenegro
6. Portugal	16. Germany	26. Tunisia	36. Costa Rica	46. Bulgaria
7. Uruguay	17. Mexico	27. Slovakia	37. Iceland	47. Norway
8. Switzerland	18. Italy	28. Ukraine	38. Scotland	48. Russia
9. Spain	19. Wales	29. Serbia	39. Turkey	49. Congo DR
10. Denmark	20. Poland	30. Iran	40. Morocco	50. Japan

Categorize the countries by region: North America, South America, Europe, Africa, and Asia/Australia.

1. Use Hamilton's method to apportion the next 20 tournaments to these five regions.
2. Use Jefferson's method to apportion the next 20 tournaments to these five regions.
3. Use Webster's method to apportion the next 20 tournaments to these five regions.
4. Were your allocations the same? Which method do you prefer? Explain.

Bonus. A 2014 article[2] ranks the fanbases of teams that competed in the 2014 World Cup held throughout Brazil. Use a device to find this article. What if you apportioned the next 20 tournaments based on these teams instead of the top 50? Use your preferred method to complete the allocation. Did the results change? Explain why or why not.

[1] "Men's Rankings." FIFA. http://www.fifa.com/fifa-world-ranking/ranking-table/men/index.html (accessed 10 January 2019).

[2] McNicholas, James. "Ranking All 32 Nations' Fanbases at 2014 World Cup." Bleacher Report. June 7, 2014. http://bleacherreport.com/articles/2085627-ranking-all-32-world-cup-fanbases (accessed: November 29, 2018).

As a reminder, here are the algorithms for the three apportionment methods required for this activity. Traditionally these methods of apportionment have been used to determine political representation and so we frame the definitions in that light.

Definition. *Hamilton's Method*

1. *Divide the total population of all the states by the total number of representatives to determine the divisor.*
2. *Divide each state's population by the divisor to determine how many representatives it should have. Record this answer, called the quota, to several decimal places.*
3. *Cut off all the decimal parts of all the quotas (but don't forget what the decimals were). These are the lower quotas. Add up the remaining whole numbers.*
4. *Assuming that the total from Step 3 was less than the total number of representatives, assign the remaining representatives, one each, to the states whose decimal parts of the quota were largest, until the desired total is reached.*

Definition. *Jefferson's Method*

1. *Pick a divisor slightly less than the standard divisor.*
2. *Divide each state's population by this new divisor. Record this answer, called the apportionment quotient, to several decimal places.*
3. *Round all of the a. q.'s down (but don't forget what the decimals were). These are the tentative apportionments. Add up the remaining whole numbers.*
4. *If the total from Step 3 was less than the total number of representatives, reduce the divisor and recalculate the quota and allocation. Repeat until the total in Step 3 is equal to the total number of representatives. The divisor we end up using is called the modified divisor or adjusted divisor.*

Definition. *Webster's Method*

1. *Same as Jefferson's Method.*
2. *Same as Jefferson's Method.*
3. *Round all the quotas to the nearest whole number (but don't forget what the decimals were). Add up the remaining whole numbers.*
4. *Same as Jefferson's Method. Repeat until the total is equal to the desired number of representatives.*