# IP model of Electoral Systems problem on AMPL (with a small data set)

param R; # number of representatives (electoral districts) from the state

param D; # number of counties in the state

set Counties; # the set of state counties

param P; # the total population of the state

param appr:=P/R; # approximate population of a district

param N; # number of candidate districts

set CandidateDistricts := 1..N; # the set of candidate districts

param p{j in CandidateDistricts}; # total population of possible district j

param c{j in CandidateDistricts}:=abs(p[j]-appr);

param a{i in Counties, j in CandidateDistricts} binary; # is 1 if county i is in candidate district j

var x{j in CandidateDistricts} binary; # is 1 if candidate j is chosen as a district

var z; # the largest c[j] of the chosen districts

minimize Largestdeviation: z;

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subject to ExactlyRdistricts:
    sum{j in CandidateDistricts}x[j]=R;
# exactly R districts should be chosen
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data;

param R:=2;

param D:=4;

## set Counties:= Athens Logan Hocking Vinton;

param P:= 20;

param N:= 4;

p[*] :=	
9.7	
9.9	
10.3	
10.1;	
	p[*] := 9.7 9.9 10.3 10.1 ;

param	a	[*.	*
			,

param a[*,*	1				
•	1	2	3	4	:=
Athens	1	0	0	1	
Logan	1	1	0	0	
Hocking	0	1	1	0	
Vinton	0	0	1	1;	