Worksheet 4 Name:_____
A&S100
02 October 2002

1. (a) Use the Hill-Huntington method to apportion the seats of a 45-member house to the three states whose populations are given below.

State	Populations
A	10,999
B	132
C	115

   (b) What does the previous example illustrate?

2. The following problem was taken from
http://www.cut-the-knot.com/ctk/Democracy.shtml
a web site by Alexander Bogomolny.

   Consider three states whose populations are given below:

State	Populations
A	39
B	70
C	270

   (a) Use Hamilton's Method to apportion the seats of a 24-member house to the three states.

   (b) Use Hamilton's Method to apportion the seats of a 25-member house to the three states.

   (c) What does this example illustrate?

3. The following problem was taken from
http://www.cut-the-knot.com/ctk/Democracy.shtml
a web site by Alexander Bogomolny.

   Use Hamilton's method to apportion the seats of a 25-member house for the two populations given below.

(a)

State	Populations
A	41
B	73
C	274

(b)

State	Populations
A	41
B	74
C	275

Examine these two apportionments to describe another undesirable characteristic of Hamilton's method. (This characteristic is sometimes called the *Population Paradox.*)

4. The following problem was taken from
http://www.cut-the-knot.com/ctk/Democracy.shtml
a web site by Alexander Bogomolny.

   In a previous problem, you used Hamilton's method to apportion the seats of a 24-member house for the three states below:

State	**Populations**
A	39
B	70
C	270

   Suppose that a new state, state D, is going to join states A, B, and C. We wish to increase the size of the house so that states A, B, and C still have 3, 4 and 17 seats, respectively, and D has a fair number of seats. It seems fair that D should have

$$\frac{90}{90+39+70+270} * 24 \approx 4.42 \text{ seats.}$$

   Rounding this number up, we decide to add 5 seats to the house. What happens when you use Hamilton's method to apportion the seats of the new 29-member house to the four states?

State	**Populations**
A	39
B	70
C	270
D	90

   (This is an example of the *New States Paradox.*)