APPORT. METHODS OF JEFFERSON, ADAMS, WEBSTER [PIRNOT 10.3]

EX 10.3.1: Using the Jefferson($\alpha = -0.38$) method, apportion 200 seats to 4 states based on population below.

STATE:	State 1	State 2	State 3	State 4
POPULATION:	30	79	46	118
APPORTIONMENT:	**22**	**58**	**33**	**87**

1^{st}, identify all known quantities: $\alpha = -0.38,\quad N = 4,\quad M = 200,\quad P_1 = 30, P_2 = 79, P_3 = 46, P_4 = 118$

2^{nd}, compute **total population**: $P = \sum_{k=1}^{4} P_k = P_1 + P_2 + P_3 + P_4 = 30 + 79 + 46 + 118 = 273$

3^{rd}, compute **standard divisor**: $D = \dfrac{P}{M} = \dfrac{273}{200}$ $\longleftarrow$ Leave D as a **fraction**! (in order to minimize round-off error)

4^{th}, compute **divisor**: $D^* = D\left[1 + \alpha\left(\dfrac{N}{M}\right)\right] = \dfrac{273}{200}\left[1 + (-0.38)\left(\dfrac{4}{200}\right)\right] = 1.354626$

Here's how to compute the above expression for D^* on a modern calculator: `(273/200)*(1+(-0.38)*(4/200))`

NOTE: Most calculators have a $\boxed{(-)}$ button for the **negative sign**. The $\boxed{-}$ button is the **minus operator**. Do not confuse these two buttons! (Otherwise the calculator will throw a `Syntax Error`.)

5^{th}, compute the **state quotas** which are also the **state apportionments**: (**rounding down**)

$$A_1 = Q_1 = \left\lfloor \frac{P_1}{D^*} \right\rfloor = \left\lfloor \frac{30}{1.354626} \right\rfloor = \lfloor 22.14633412 \rfloor = \mathbf{22}$$

$$A_2 = Q_2 = \left\lfloor \frac{P_2}{D^*} \right\rfloor = \left\lfloor \frac{79}{1.354626} \right\rfloor = \lfloor 58.31867984 \rfloor = \mathbf{58}$$

$$A_3 = Q_3 = \left\lfloor \frac{P_3}{D^*} \right\rfloor = \left\lfloor \frac{46}{1.354626} \right\rfloor = \lfloor 33.95771231 \rfloor = \mathbf{33}$$

$$A_4 = Q_4 = \left\lfloor \frac{P_4}{D^*} \right\rfloor = \left\lfloor \frac{118}{1.354626} \right\rfloor = \lfloor 87.10891419 \rfloor = \mathbf{87}$$