

B)

$$\sum a_i = S$$

$$\sum a_i^2 = A$$

add x

$$(\sum a_i + x)^2$$

$$= (\sum a_i)^2 + 2 \sum a_i \cdot x + x^2$$

$$= S^2 + \boxed{2 \cdot 5 \cdot \textcircled{8}} + \textcircled{x^2}$$

$$\sum a_i^2 + x^2 = A + \textcircled{x^2}$$

$$S^2 + 2Sx + x^2 = A + x^2$$

$$2Sx = A - S^2$$

$$x = \frac{A - S^2}{2S}$$

$$(\sum a_i + \sum x_i)^2$$

$$\sum x_i = T$$

$$\sum x_i^2 = X$$

$$= (S + T)^2$$

$$= S^2 + T^2 + 2 \cdot S \cdot T$$

$$\text{Q45: } \sum a_i^2 + \sum x_i^2 = A + X$$

$$S^2 + T^2 + 2 \cdot S \cdot T = A + X$$

$$(\underbrace{S^2 - A}_{\text{}}) + 2ST = (X - T^2)$$

$$\sum a_i^2 = \left(\sum a_i \right)^2$$

$$= \sum a_i^2 + 2 \cdot \sum_{i < j} a_i a_j$$

$$0 = \sum_{i \neq j} a_i a_j$$

$$(S+x+y)^2 = A + x^2 + y^2$$

$$= S^2 + x^2 + y^2$$

$$+ 2S(x+y) + 2xy = A + x^2 + y^2$$

$$2(S(x+y) + xy) = A - S^2$$

$$S(x+y) + xy = \Delta$$

$$= \frac{A - S^2}{2}$$

$$(x+S)(y+S)$$

$$= xy + (x+y)S + S^2$$

$$(x+S)(y+S) = \Delta + S^2$$

$$\downarrow \quad \downarrow$$

$$1 \quad \Delta + S^2$$

$$= 1 \cdot (\Delta + S^2)$$

$$|S| \leq N \cdot 10^3 \leq 10^6$$

$$|S|^2 \leq 10^{12}$$