Ⅰ. Short Review

1. Measures of Dispersion
   - Range : R = Max(x) – Min(x)
   - Intra Quartile Range(IQR) : IQR = 75^{th} percentile(the third quartile) – 25^{th} percentile(the first quartile)
   - Mean Deviation : $\frac{\sum f|x-\mu|}{N}$, $\frac{\sum f|x-\bar{x}|}{n}$
   - Variance (V(x)) : $\sigma^2 = \frac{\sum f(x-\mu)^2}{N}$, $s^2 = \frac{\sum f(x-\bar{x})^2}{n-1}$
   - Standard Deviation : $\sigma = \sqrt{\sigma^2}$, $s = \sqrt{s^2}$
   - Degree of Freedom : sum of deviation = 0, this condition make "n-1"(DoF). If # of sample data = 1, we cannot calculate SD, not 0. That's why we need "n-1"
   - Skewness : positively skewed, negatively skewed
   - Kurtosis : Lepto, Meso, and Plat

2. Probability
   - P(event) = $\frac{\text{\# of certain event}}{\text{\# of all events}}$; P(all events) = 1
   - $P(X^c) = 1 - P(X)$
   - $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   - Mutually exclusive outcome : $P(A \cap B) = 0$
   - Independent outcome : $P(A \cap B) = P(A) \times P(B)$
   - Conditional probability : $P(A|B) = \frac{P(A \cap B)}{P(B)}$

3. Normal Distribution : bell shaped, symmetric, unimodal, x = $-\infty$ to $+\infty$

4. Probability Distribution
   - Expected value (E(X)) : $\sum X \cdot P(X)$ = mean
   - Empirical rule (in normal distribution) : $\pm 1SD \approx 68\%$, $\pm 2SD \approx 95\%$, $\pm 3SD \approx 99.7\%$
   - Continuous case : we can get probability from range only

Ⅱ. Problems

1) Find variance, standard deviation, and range from the result of asking 30 people(population) how many brothers and sisters they had

2 1 1 2 0 1 0 3 2 0 1 1 5 1 2 2 2 1 1 3 0 2 4 0 0 2 1 0 1 2

2) Calculate variance, standard deviation, and IQR from the table which is sample data of 35 UTD students

<Amount of time spent studying on a this class>

Hours	# of students
1	2
2	5
3	4
4	6
5	5
6	7
7	3
8	2
9	1

3) A is event which is people own color TV , B is event which is people own HDTV set. We know $P(A \cup B) = .92, P(A) = .86, P(B) = .35$. What is $P(A \cap B)$?

4) Calculate the probability of is $P(A \cap B), P(A \cap C)$: A is event of raining tonight, B is no rain tonight. And C is event of raining tomorrow night. (Assumption : today's weather does not affect tomorrow's weather)
P(A) = 75%, P(B) = 25%, P(C) = 10%

5) Amazon knows the probability is .80 that an order will be ready for shipment on time, and .72 that an order will be ready for shipment on time and will also be delivered on time. What is the probability that such an order will be delivered on time given that it was ready for shipment on time?