[10] Today, 1,000 students came to the campus and only 50 students are sampled to check the body temperature. The following table shows the number of students with temperatures in 0.2° interval.

(a) Find the **sample mean** and the **sample variance** of body temperature (Note: calculate the sample mean with *one digit below the decimal point* and the sample variance with *two digits below the decimal point*). [6 pts]

Temp(°C)	35.5	35.7	35.9	36.1	36.3	36.5	36.7	36.9	37.1	37.3	37.5	37.7
# of Students	1	2	7	5	7	11	9	4	2	0	1	1
Calculation space	1/50	2/50	7/50	5/50	7/50	11/50	9/50	4/50	2/50	0/50	1/50	1/50

3

(a)-1 Sample mean	(a)-2 Sample variance
Sample의 mean은 온도에 대해 해당 온도의 학생수 / 총 sample된 학생수 를 구한후 해당온도와 곱한 후 합치면 된다. 즉, $\frac{1\times35.5}{50}+\frac{2\times35.7}{50}+\cdots+\frac{1\times37.5}{50}+\frac{1\times37.7}{50}$ = 36.432 이다.	Variance는 각 온도(X_i)에서 평균을 빼준 값을 제곱한 뒤 모두 더한 값을(전체 학생수-1)로 나눈 값이다. 따라서 Sample variance는 0.3403 이다. $\frac{(35.5-36.432)^2}{49}\times1+\frac{(35.7-36.432)^2}{49}\times2+\cdots+\frac{(37.5-36.432)^2}{49}\times1+\frac{(37.7-36.432)^2}{49}\times1=0.3403$

(b) Estimate the total number of students among 1,000 students whose temperature can be above 37°C. (Note: You MUST use the z-Table) [3 pts]

(b) $z=\frac{37-36.432}{\sigma}=\frac{37-36.432}{\sqrt{0.3403}}=0.9736824$ 이다. Z-Table에서 Y≤z일 때의 확률이 0.8340이므로 37°도 보다 온도가 높은 학생들은 1-0.8340 = 확률이다. 따라서 1000을 곱하면 166명이 된다.

[11] A data packet contains a 4-digit password 2045. Each code word contains a single character encoded using **ASCII codes** that form octabit (8-bit) data plus an even-parity bit.

(a) Generate a data packet that includes a LRC code word. [3 pts]

(b) Find the **data increase factor** for your data packet. [2 pts]

3

(a)

									Pe
2	0	0	0	0	0	0	1	0	1
0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	1	0	0	1
5	0	0	0	0	0	1	0	1	0
LRC	0	0	0	0	0	0	1	1	0

(b) 2

$DIF=\frac{9\times5}{8\times4}=\frac{45}{32}$

