

Name _____ Student ID _____

Prince of Songkla University
Department of Industrial Engineering, Faculty of Engineering

Mid Term Examination: Semester 1

Academic Year: 2005

Date: 31 July 2005

Time: 13.30 – 16.30

Subject: 225-491 Problem Solving with Statistical Techniques

Room: R 300

ทฤษฎีในการสอบ โทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทฤษฎี และพักการเรียนหนึ่งภาคการศึกษา

Instructions: Read carefully

1. All materials are allowed.
2. There are 5 problems, do all of them. Also show your work clearly and legibly.
3. Answer the questions in the answer book, only.
4. You must write your name and your student ID in every page of the test.
5. Total score is 100 points.

Distribution of Score

Problem	Points
1	20
2	20
3	20
4	20
5	20

Tests are prepared by
Nikorn Sirivongpaisal



Problem 1: (20 points) Answer these following questions, shortly.

(a) Explain the meaning of "QUALITY IS A STRATEGY THAT AIMS TO ESTABLISH LONG TERM PROFIT IN BUSINESS".

(b) Explain the characteristics of problem, related to Juran's Quality Trilogy.

(c) Explain the definition of "PROBLEM", "SYMPTOM", and "CAUSE"



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(d) Explain the steps to obtain "SHOULD PERFORMANCE" in problem solving.

(e) Explain the concept used to define "CUSTOMER" in problem solving process.

(f) Explain the process of management by fact.

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(g) Explain the difference of characteristics between “COMMON CAUSE” and “SPECIAL CAUSE”.

(h) Explain the difference between “TRAINING” and “EDUCATION” in 14 Points of Deming Management.

(i) Explain the process of statistical decision making.

(j) Explain the relationship between “PARAMETER”, “MEASUREMENT SCALE”, and “DATA”.



Problem 2: (20 points) The following data represent company customers' claim of automobile parts from January 2004 to June 2004.

Stratified by types of claim: unit (pieces)

Types of Claim	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
Technical	4	3	3	6	5	11
Transportation	22	16	28	20	48	35
Others	0	1	2	1	0	4

Stratified by cost: unit (Baht)

Types of Claim	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
Technical	3,500	1,600	1,462	4,800	7,831	4,658
Transportation	18,000	13,000	45,000	15,550	59,800	43,250
Others	0	130	640	160	0	1952

Also there are additional data collected about claim on transportation, which represent in the following tables.

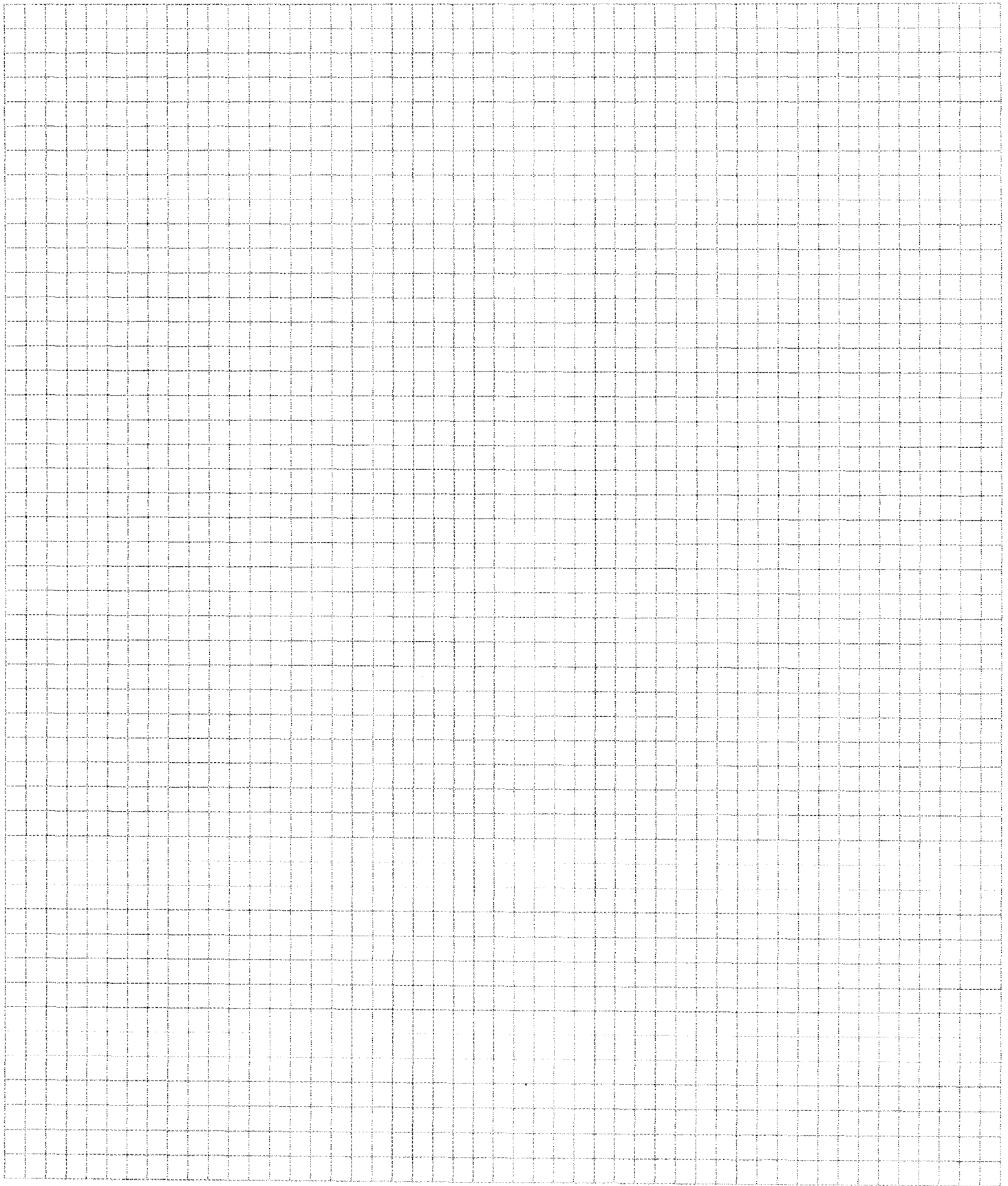
Stratified by claim on transportation: unit (pieces)

Part	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
A	3	2	3	1	1	2
B	1	0	1	2	1	0
C	2	1	3	4	10	8
D	1	0	2	1	1	0
E	2	1	0	1	1	1
F	3	4	4	4	8	4
G	10	8	15	7	26	20

Stratified by cost of transportation claim: unit (Baht)

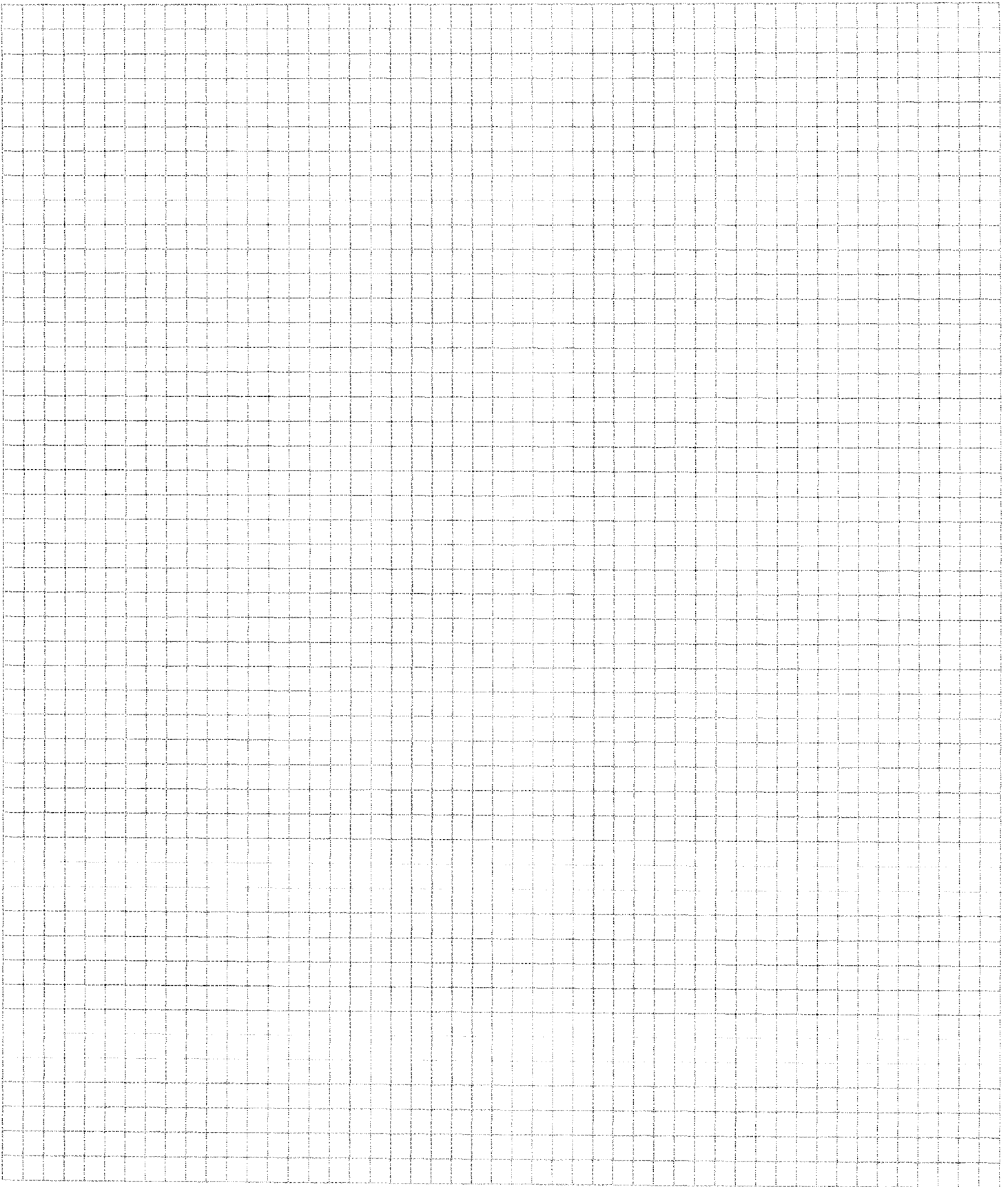
Part	Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004
A	2,016	1,344	2,016	672	672	1,344
B	107	0	107	214	107	0
C	700	350	1,050	1,400	3,500	2,800
D	535	0	1,070	535	535	0
E	1,344	672	0	672	672	672
F	1,605	2,140	2,140	2,140	4,280	2,140
G	230	184	345	161	598	460

From these provided data, analyze them to define problem theme. You can make any reasonable assumption in your analysis.



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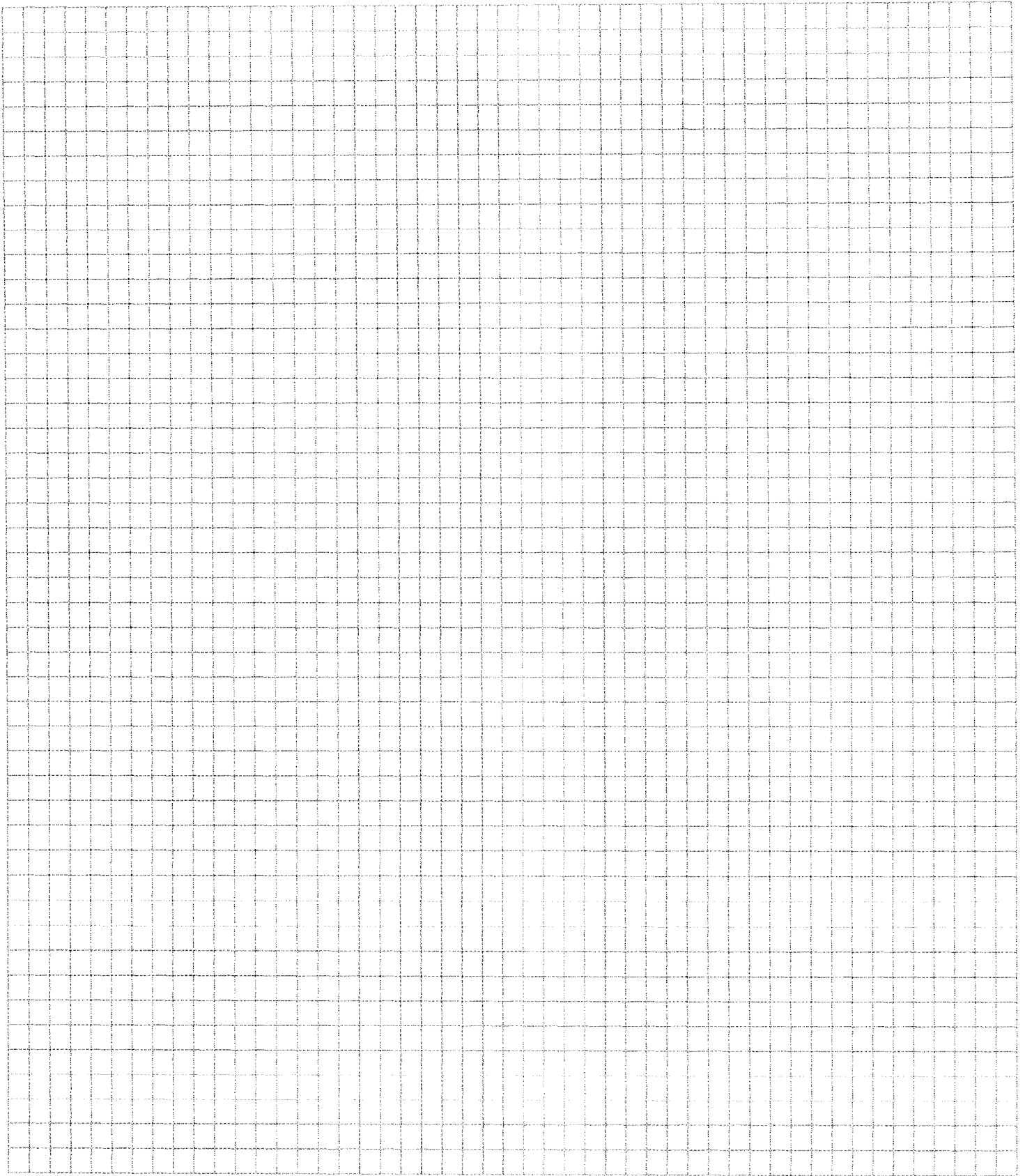
Problem 3: (20 points) The following data are records of customer complaints about customer's orders of a company:

Day	Number of Orders	Number of Complaints
1	115	15
2	220	18
3	210	23
4	220	22
5	220	18
6	210	24
7	440	45
8	365	47
9	255	13
10	255	15
11	300	30
12	65	5
13	300	24
14	100	7
15	255	20

From the above data, do you think whether they are stability or not? If they are stability, how much is the proportion of customer complaints?

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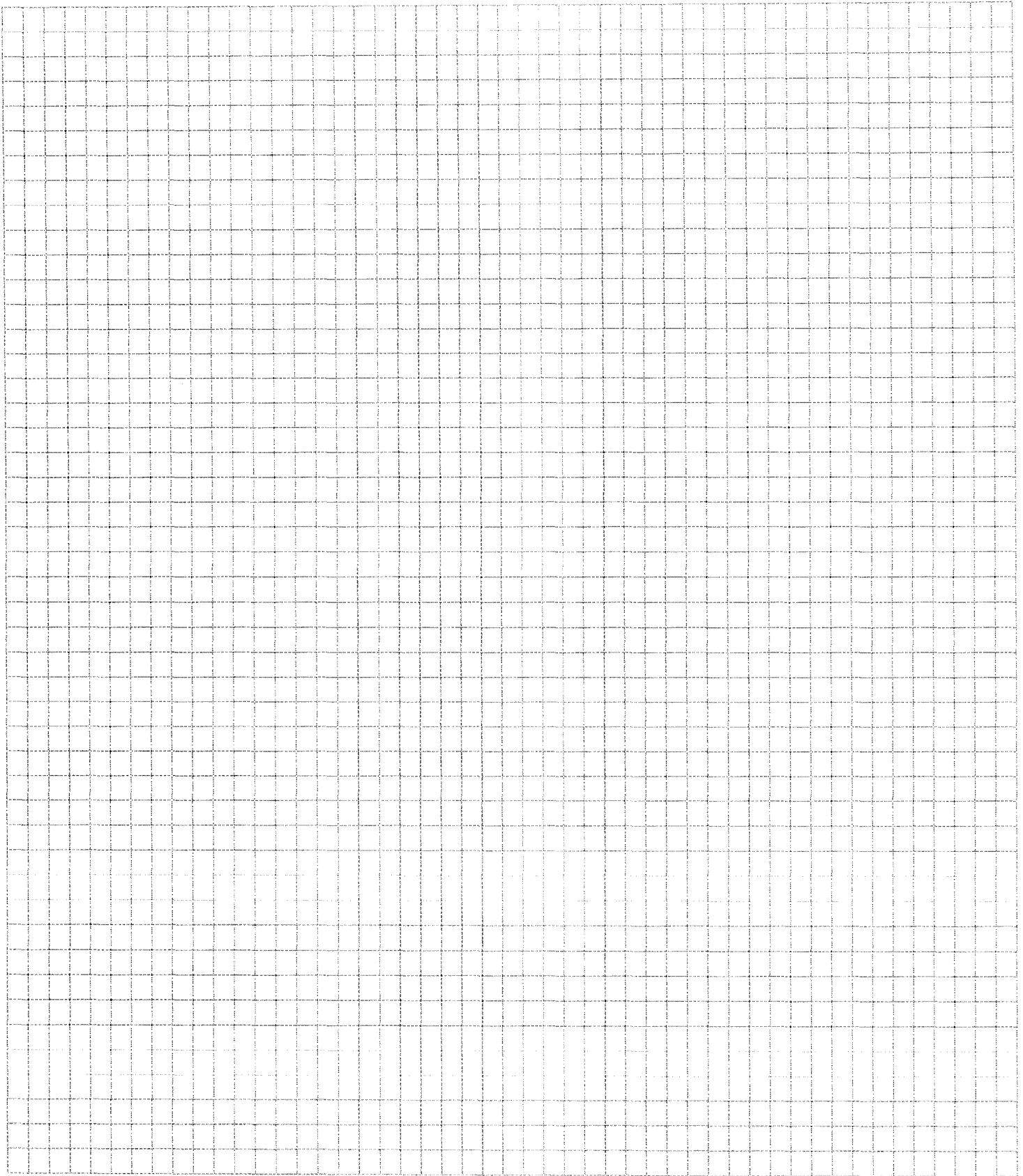
Problem 4: (20 points) The following data represent the percentage breakdown of machine in tuna plant of canned food manufacturing.

Month	% Breakdown	Month	% Breakdown
Jan 2003	15.50	Oct 2003	13.40
Feb 2003	8.90	Nov 2003	13.60
Mar 2003	12.60	Dec 2003	13.73
Apr 2003	11.10	Jan 2004	13.40
May 2003	9.99	Feb 2004	12.13
Jun 2003	11.25	Mar 2004	13.12
Jul 2003	12.27	Apr 2004	12.57
Aug 2003	11.62	May 2004	12.62
Sep 2003	11.60		

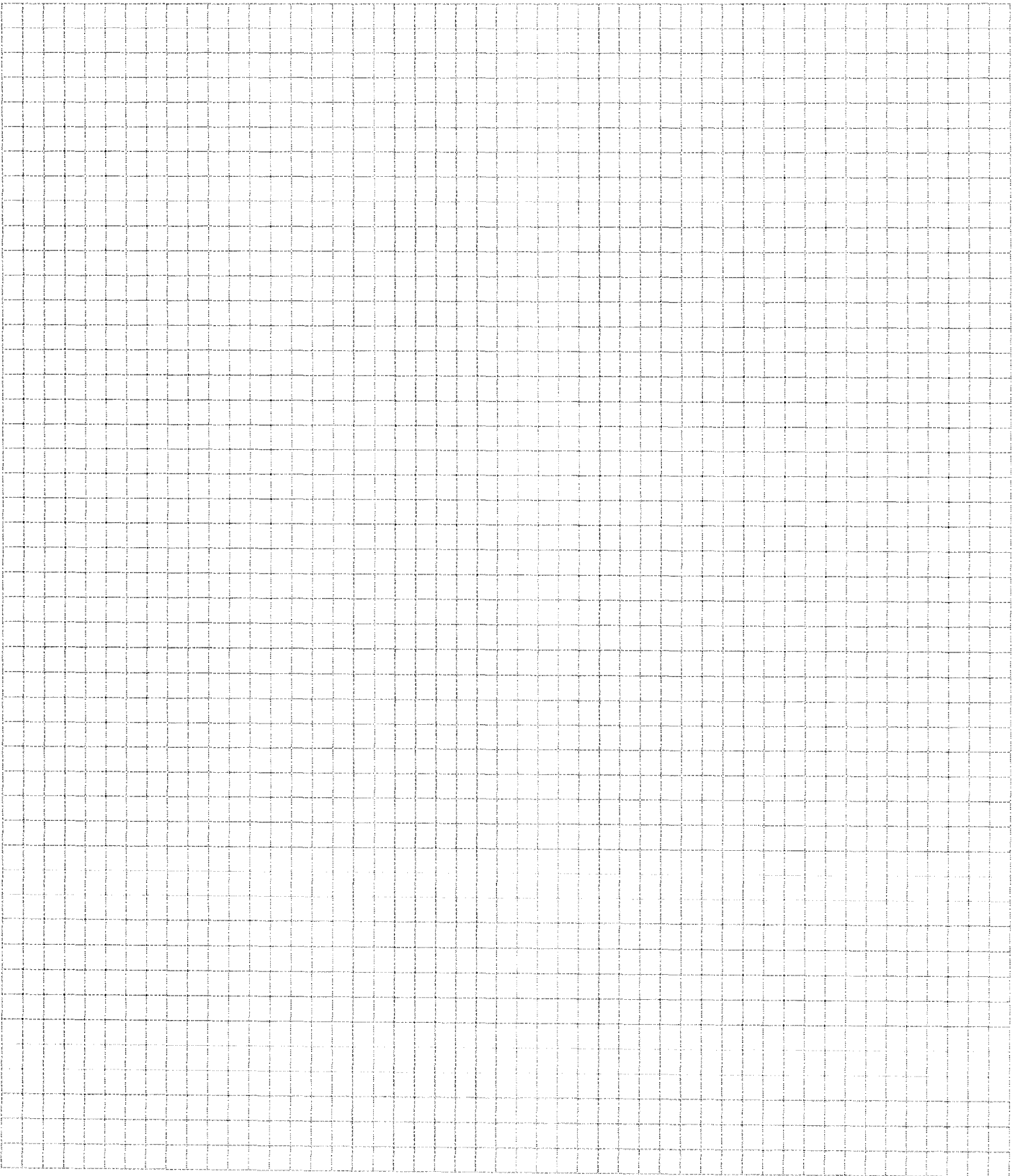
Define the baseline of the current percentage breakdown of this machine and set the target for solving breakdown problem.

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Problem 5: (20 points) The following data represent the number of outpatients, who arrive at the hospital, in every 20 minutes.

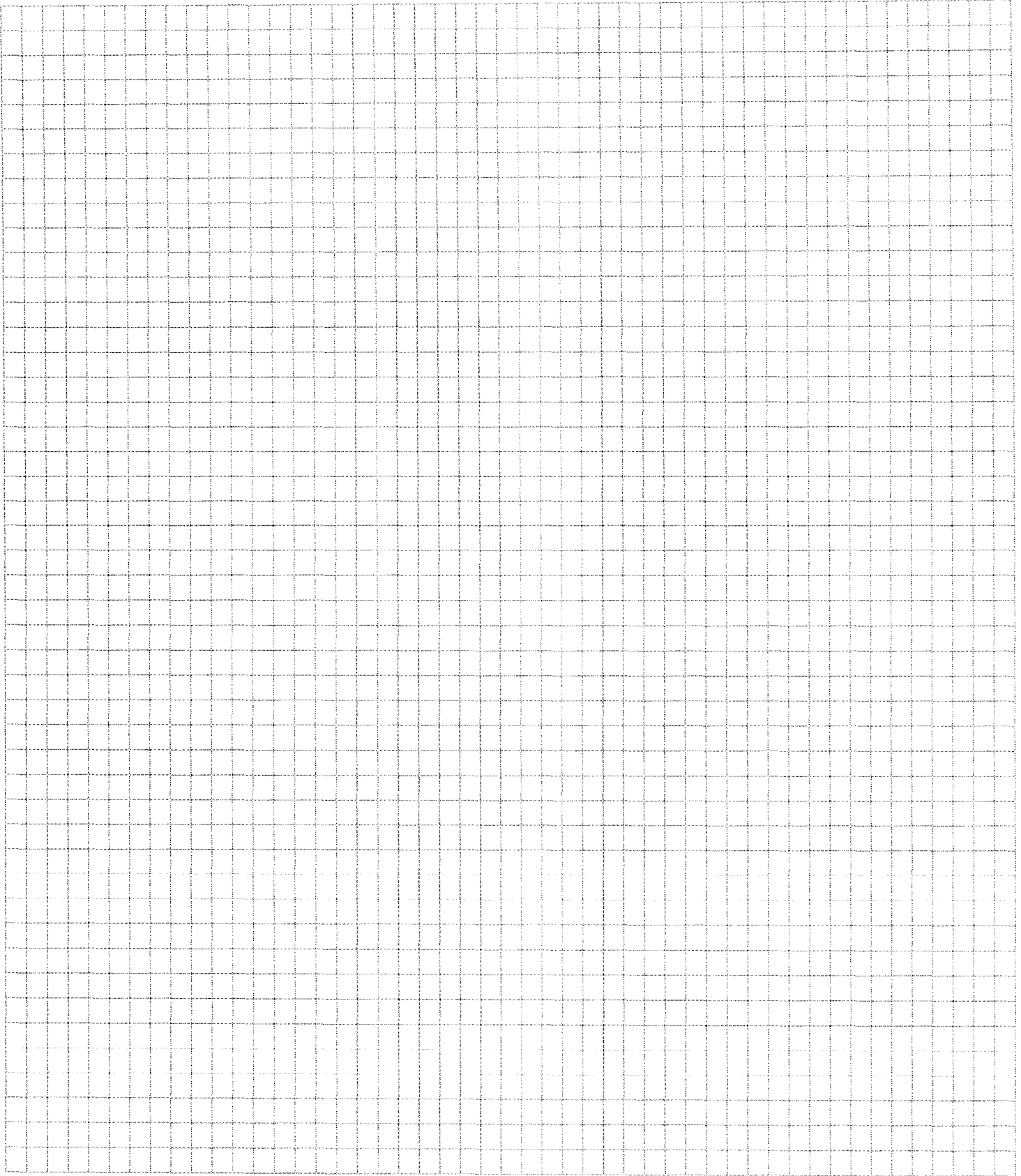
Time	Number of Outpatients
08.00 – 08.20	45
08.20 – 08.40	40
08.40 – 09.00	32
09.00 – 09.20	25
09.20 – 09.40	20
09.40 – 10.00	12

Use the appropriate statistical tool to answer the followings questions:

- (a) Illustrate the variation in number of outpatients.
- (b) Can you state that the average number of outpatients, who arrive at the hospital during 08.00 - 10.00, is equal 36 persons.

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