



Course Title: Design tools and production aids
Date: Jun 5th 2022 (Final term, Exam)

Course Code: MPD4233
Allowed time: 3 hr

Year: 4th
No. of Pages: (1)

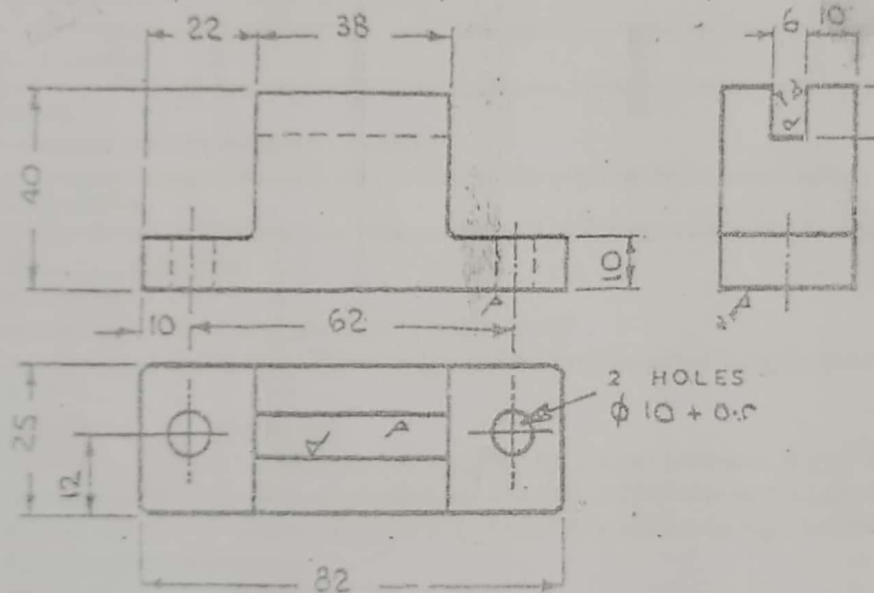
Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches).
اجب عن الاسئلة الاتية - افرض اي بيانات غير موجودة - يجب ان تكون الاجابة مدعمة بالاسكتشات.

Problem number (1) (25 Marks)

Design Drill, used to drill material Mild Steel, Where: A (deg), B (deg). C (deg), 118, 12, and 59 angles respectively?

Problem number (2) (25 Marks)

Design the fixture for Milling slot, 38 X 6 mm as shown in Figure below.?



Problem number (3) (25 Marks)

Explain in detail the design of A simple cutting die, illustrate all parts and functions?

Problem number (4) (25 Marks)

Design Extrusion Die for Solid Cross Section?


 Course Title: Total quality management (5 مقرر اختياري)
 Date: June 8th 2022 (Final term. Exam)

 Course Code: MPD4237
 Allowed time: 3 hr

 Year: 4th
 No. of Pages: (1)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches). اجب عن الاسئلة الاتية - افرض اي بيانات غير موجودة. يجب ان تكون الاجابة مدعمة بالاسكتشات.

Problem number (1) (15 Marks)

Choose the correct Answer

1. Fitness for use

- Quality defined in terms of product or service usefulness for the price paid.
- A definition of quality that evaluates how well the product performs for its intended use.
- The probability that a product, service, or part will perform as intended.

2. Value for price paid

- Quality defined in terms of product or service usefulness for the price paid.
- Quality defined in terms of the support provided after the product or service is purchased.
- Interdepartmental barriers Management leadership

3. Support services

- Quality defined in terms of the support provided after the product or service is purchased.
- Quality defined in terms of product or service usefulness for the price paid.
- Quality costs Process control Failure mode and effect analysis.

4. ISO 9000

- Interdepartmental barriers Management leadership
- A set of international quality standards and a certification demonstrating that companies have met all the standards specified.
- A set of international standards and a certification focusing on a company's environmental responsibility.

5. ISO 14000

- Interdepartmental barriers Management leadership
- A set of international quality standards and a certification demonstrating that companies have met all the standards specified.
- A set of international standards and a certification focusing on a company's environmental responsibility.

Problem number (2) (30Marks)

- Why TQM efforts fail?
- Write short notes about Quality Gurus and Their Contributions?
- Mention various characteristics of the different stages in the development of Total Quality Management?

Problem number (3) (20 Marks)

Use Cause-and-Effect Analysis to show the average time that it takes Memphis Warehouse to complete a customer order is considered too high and a quality control manager is working to find the root causes for the high cycle time. He collected enough information during a brainstorming session and tabulated the information.

Problem number (4) (20 Marks)

A cellular phone service provider was facing a high volume of returned phones from its customers. The quality control manager decided to conduct a Pareto analysis to determine what factors contributed the most to causing customer dissatisfaction. The data in Table below were gathered from Customer Services during a period of 1 month to analyze the reasons behind the high volume of customers' return of cellular phones ordered online. The table of data shown below. Use and construct a Pareto chart to solve the problem.

Factors	Frequency
Misinformed about the contract	165
Wrong products shipped	37
Took too long to receive	30
Defective product	26
Changed my mind	13
Never received the phone	12
Total	283



Course Title: Operations Research

Date: Ju 2022

Total Marks: 85

Course Code: MPD 4232

Allowed time: 3 hrs.

No. of Questions: 8

Question 1. Differentiate the followings using the simplex and graphical method (20 marks)

$\text{Max } Z = 3x_1 + 9x_2$ Subject to $x_1 + 4x_2 \leq 8$ $x_1 + 2x_2 \leq 4$ and $x_1 \geq 0, x_2 \geq 0$	$\text{Max } Z = 2x_1 + 4x_2$ Subject to $x_1 + 2x_2 \leq 5$ $x_1 + x_2 \leq 4$ and $x_1 \geq 0, x_2 \geq 0$	$\text{Max } Z = 2x_1 + x_2$ Subject to $x_1 - x_2 \leq 10$ $2x_1 \leq 40$ and $x_1 \geq 0, x_2 \geq 0$	$\text{Max } Z = 3x_1 + 2x_2$ Subject to $2x_1 + x_2 \leq 2$ $3x_1 + 4x_2 \geq 12$ and $x_1 \geq 0, x_2 \geq 0$
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Question 2. Solve the following model using the graphical method. (10 marks)

$$\text{Max } Z = 2x_1 + 3x_2$$

Subject to

$$x_1 + x_2 \leq 30$$

$$x_2 \geq 3$$

$$x_1 - x_2 \geq 0$$

$$x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

Question 3. A furniture factory produces desks, tables, and chairs. Each product needs specific amount of lumber and hours of machining for carpentry and finishing. These needs are reported in the attached table. If five tables, at most, can be sold per week, find the production mix to maximize the weekly revenue using the simplex method. (20 marks)

Resource	Desk	Table	Chair	Availability
Lumber (board feet)	8	6	1	48
Carpentry hours	2	1.5	0.5	8
Finishing hours	4	2	1.5	20
Maximum demand	∞	5	∞	
Price (\$)	60	30	20	

Question 4. A company of air coolers has two plants located at City A and City B with capacities of 200 units and 100 units per week, respectively. The company supplies the air coolers to four showrooms situated at I, II, IV, and V, which demand 70, 100, 100, and 30 units, respectively. The selling price differs at each showroom. The attached table shows the **profit** for each unit transported from each plant to each showroom. Plan the transportation program using the least cost method and calculate the corresponding profit. (5 marks)

	I	II	IV	V
City A	90	90	100	110
City B	50	70	130	85



Course Title: Operations Research

Date: July 2022

Total Marks: 85

Course Code: MPD 4232

Allowed time: 3 hrs.

No. of Questions: 8

Question 5. Solve the following transportation problem using Vogel's approximation method if the attached matrix is a cost one. (10 marks)

10	20	5	7	10
13	9	12	8	20
4	15	7	9	40
14	7	1	0	40
3	12	5	19	50
60	60	20	10	

Question 6. Seven projects are to be completed, and seven different contractors are requested to submit bids, each contractor is capable of performing any of the projects but can complete only one. It may be further noted that the bid of contractor i on each project j is c_{ij} . The bids are submitted in thousands of dollars, as it is important to remember that each contractor can complete only one job, the objective function is to subcontract the jobs at a minimal cost. Solve the assignment problem.

Contractor	Project				
	I	II	IV	X	XI
A	2	4	6	3	5
B	4	3	1	2	4
C	2	1	5	7	1
D	9	2	1	4	5
E	8	6	4	3	2

(15 marks)

Question 7. Use the graphical method to minimize the time needed to process the following jobs on the machines as shown. For each machine find which job is to be loaded first. Calculate the total time required to process the jobs. The time given is in hours. The machining order for job 1 is $ABCDE$ and takes 3, 4, 2, 6, 2 hours respectively on the machines. The order of machining for job 2 is $BCADE$ and takes 5, 4, 3, 2, 6 hours respectively for processing.

(10 marks)

Question 8. A paper mill makes jumbo reels of width 1 m. They received an order for 150 reels of width 25 cm, 200 reels of width 35 cm, and 300 reels of width 45 cm. These rolls are to be cut from the jumbo reel. The cutter blade combinations are such that any combination must have at least two cutter blades with different widths. Determine the total number of jumbo reels and cutting combinations to minimize trim. (Hint: there are four cutter blade combinations). Write the mathematical formulation of the problem. (10 marks)

With our best wishes



Tanta University

Production Engineering and Mechanical Design Department

Final Exam – Second Term – Academic Year 2021/2022



Faculty of Engineering

Course Title: Elective Course (4): Jigs and Fixtures

Course Code: MPD4235

Year: 4TH Year Production Students

Date: 1 June 2022

Allowed Time: 3 Hrs.

Total Marks: 75 Marks

تعليمات: (١) الامتحان مكون من أربعة أسئلة في صفتين - (٢) أجب عن جميع الأسئلة مع افتراض أي بيانات ناقصة - (٣) دعم إجابتك بالرسم كلما أمكن ذلك. - (٤) يجب الاهتمام بكافة تفاصيل الرسومات المطلوبة لأن عليها جزء كبير من تقييم الأسئلة كذلك يجب استخدام الأدوات في الرسم والاهتمام بجودته.

Question 1: [20 Marks]

- What is the main difference between jigs and fixtures?
- What is the best location shape? Why?
- What is the jamming problem? How it can be avoided?
- What is the clamping process? What are its main functions?
- Draw a neat sketch to show the details of the following:
 - Adjustable conical locator.
 - Sliding clamp with heel pin.

Question 2: [20 Marks]

Design a drill jig for use when drilling the Φ 12 mm hole in the part shown in Figure 1. The part is complete except for this hole.

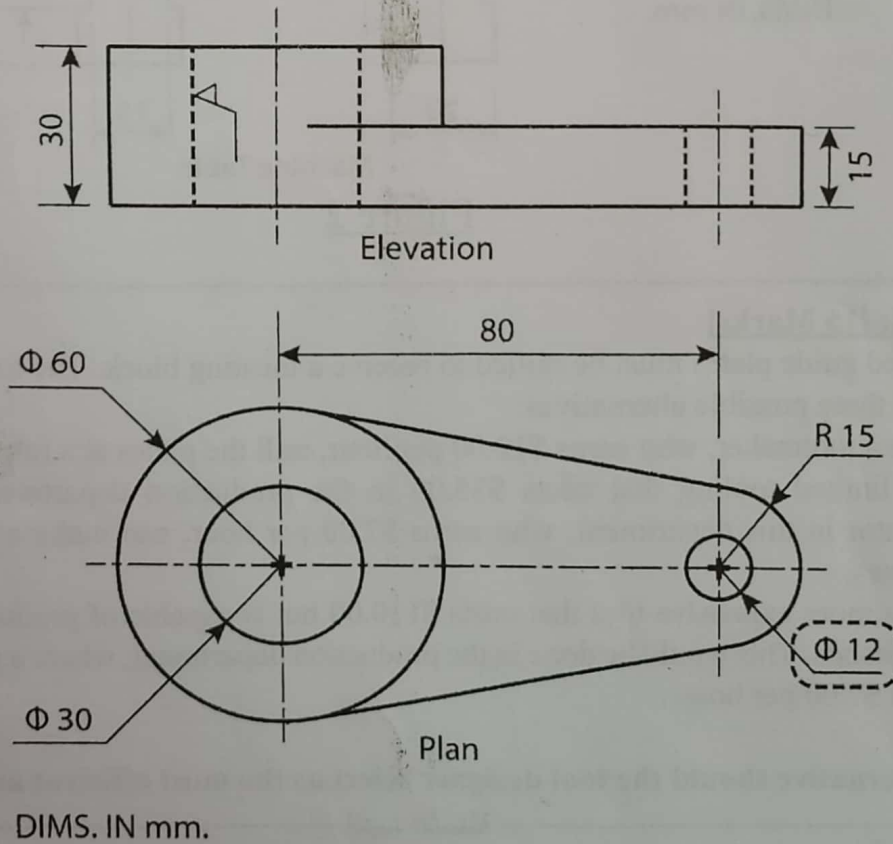


Figure 1

Question 3: [20 Marks]

Design a milling fixture for use when milling the 10×10 slot in the part shown in Figure 2. This is the last machining operation to be done on the part. The details of the milling machine table are given in the figure.

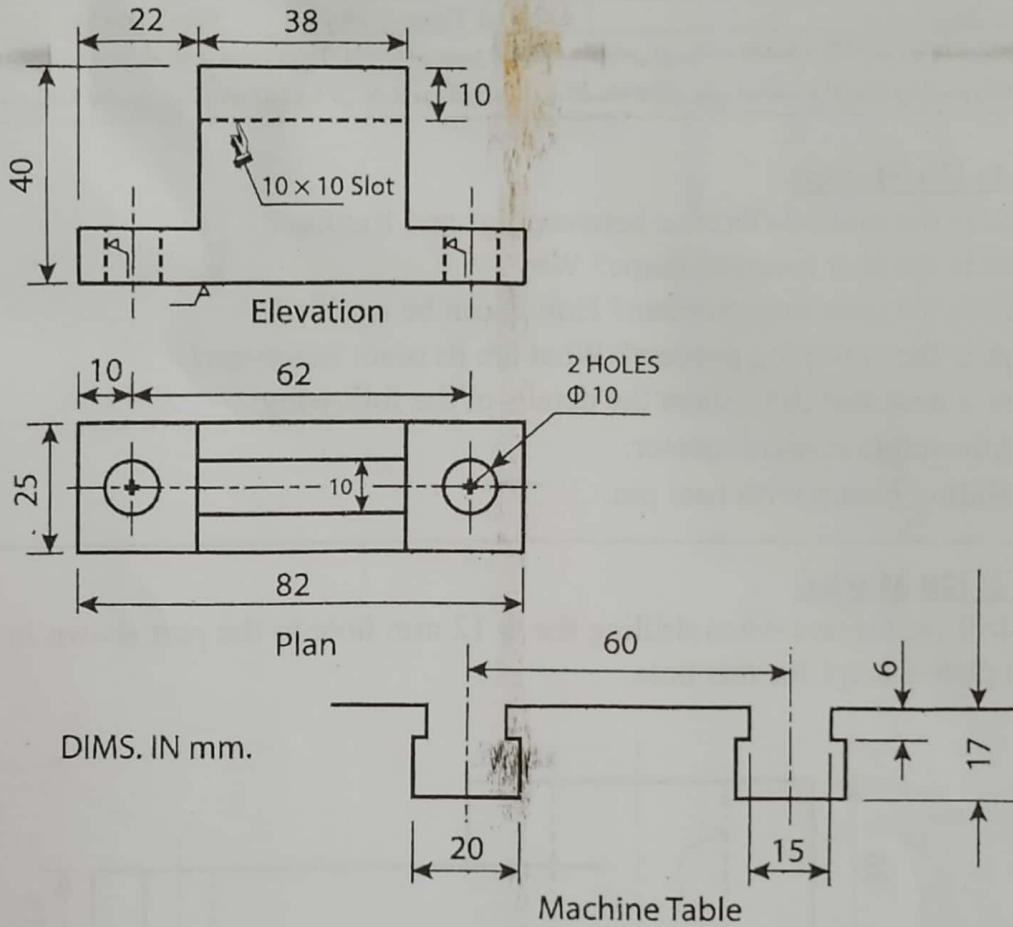


Figure 2

Question 4: [15 Marks]

Five hundred guide plates must be milled to receive a locating block. The tool designer has determined three possible alternatives:

- 1- Have a toolmaker, who earns \$12.00 per hour, mill the plates at a rate of 25 per hour.
- 2- Use limited tooling that costs \$35.00 in the production department. The machine operator in this department, who earns \$7.00 per hour, can make a part every 1.333 minutes.
- 3- Use a more expensive tool that costs \$110.00 but is capable of producing a part every 24 seconds. This would be done in the production department, where a machine operator earns \$7.00 per hour.

Which alternative should the tool designer select as the most efficient and economical?

----- انتهت الأسئلة -----

مع أطيب التمنيات بالتوفيق والنجاح د.م/ أحمد حوام واللجنة



Tanta
University

Mechanical Production Department
Total Marks: 70 Marks



Faculty of Engineering

Course Title	Statistics and Quality Control	Academic Year	Course-Code	MPD4234
Year/ Level	Fourth Year	2021/2022 Second Semester Exam		
Date	15-06-2022	No. of Pages (2)	Allowed time	3 hrs
Remarks: (answer all the following questions)				

Question Number (1)

(20 Points)

- a) A sample of 30 electrical components was tested by operating each component continuously until it failed. The time to the nearest hour at which each component failed was recorded as follow
31, 41, 46, 33, 44, 51, 56, 63, 71, 71, 62, 63, 54, 53, 51, 43, 36, 38, 54, 56, 66, 71, 74, 75, 46, 47, 59, 60, 61, 63
- Make a frequency table for this data using open class intervals with width 5.
 - Draw the frequency histogram, frequency polygon and O-give.
 - Find mean, standard deviation, median and mode of the data in the grouped frequency distribution.
- b) let A and B are two events with $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$, find:
 $P(A \cup B)$, $P(A^c \cap B^c)$, $P(B/A)$, $P(A/B^c)$.
- c) A city installs 2000 electric lamps for street lighting. These lamps have a mean burning life of 165 hours with a standard deviation of 10 hours. The normal distribution is a close approximation to this case, Find:
- Probability that a lamp life time is greater than 190 hours.
 - Probability that a lamp life time is at most 160 hours.
 - Number of lamps, their life times between 140 and 180 hours.
- d) A random sample of 30 items is drawn from a lot.. If the lot is 10% defective, determine the probability that such sample will contains:
- No defectives.
 - More than two defectives.
 - the mean value of defectives.

Question Number (2)

(20 Points)

- a) It is known that of the articles produced by a factory, 20% come from Machine A, 30% from Machine B, and 50% from Machine C. The percentages of satisfactory articles among those produced are 95% for A, 85% for B and 90% for C. An article is chosen at random.
- What is the probability that it is satisfactory?
 - Assuming that the article is satisfactory, what is the probability that it was produced by Machine A?

b) Determine the value of k that will make $f(x) = \begin{cases} \frac{k}{x^2} & 1 \leq x < 3 \\ 0 & \text{otherwise} \end{cases}$ pdf, then

- I. Find $P(2 \leq X < 3)$.
 - II. Find the probability that X is exactly equal to 2.
 - III. Find the mean and standard deviation of this probability distribution.
- c) Manufacturer has a lot of 5% defective items. what probability that the first defective item will be the fifth item selected?
- d) For the following data taken for 6 children if X represents the number of digits that a child can remember for a short time and Y is the child age

X	3	5	6	8	12	14
Y	16	10	7	4	3	2

- I. Compute the linear correlation coefficient (r) and determine its type.
- II. Find the linear prediction equation and use it to estimate Y when $X = 7.5$.

Question Number (3)

(30 Points)

- a) Define and explain by sketches if possible: Reliability, Hazard function, Bathtub curve, Quality control, Quality assurance, Quality tools, and reasons for lack of control.
- b) For a system has four units with failure rates 2, 1.5, 4, 3.8 failures/10⁶hrs, find:
 - I. Reliability of each unit.
 - II. Reliability for 10hrs of the system if units in series connection.
 - III. Reliability for 10hrs of the system if units in parallel connection.
- c) For a **Variable control charts** are maintained on a certain dimension of manufactured part which is specified as 2.05 ± 0.02 cm with subgroup size is 4. The values of \bar{x} and R are computed for each subgroup. After 20 subgroups we found that $\sum \bar{x} = 41.283$ and $\sum R = 0.28$. If the dimensions fall above USL, rework is required but if it fall below LSL, the part must be scrapped. If the process is in statistical control with $A_2=0.73$, $D_3=0$, $D_4=2.28$, $d_2=2.059$ and normally distributed, determine:
 - I. 3σ control limit for the charts.
 - II. the process capability.
 - III. the percentage of scrap and rework.
 - IV. Do you think that the process meets the specifications? How it can be improved?
- d) A government agency samples 200 documents per day from a daily lot of 6000. It was found from past records that the standard or reference value for the fraction nonconforming is $P = 0.075$. Determine the centre line and control limits for **np chart**.

..... End of questions

Dr. Eman Elghamry and Examination Committee

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998