MAT121 Statistics I- Section 09

Midterm Exam 01

Fall 2025

Name _____ WCUID Number_____
(please print) (please print)

Instructions

1. **Formula Sheet**:
   - You are allowed to bring **one formula sheet** (8.5" x 11", single-sided or double-sided) with **formulas only**.
   - The formula sheet must be handwritten or printed and will be collected at the end of the exam.
2. **Calculators**:
   - (Graphing or scientific) calculators are allowed for this exam.
   - Calculators with internet access, communication capabilities, or stored notes are **not allowed**.
3. **Notebooks and Notes**:
   - **No notebooks, notes, or additional materials** are allowed during the
4. **Exam Versions**:
   - Each student will receive a **different version** of the exam.
   - Ensure you are working on your assigned version only.
5. **Multiple Choice Problems**:
   - For multiple-choice questions, **manually calculate** your answer and select the option that is **closest to your calculated result**.
   - If your calculated answer does not match any option exactly, choose the **closest value**.
6. **General Rules**:
   - No communication or collaboration with other students is allowed during the exam.
   - All electronic devices (e.g., phones, smartwatches) must be turned off and stored away.

To indicate your answer, completely fill in the corresponding circle. For each question, only one choice is correct. If your calculated answer does not match any option exactly, choose the **closest value**.

1. The following frequency table of the income, denoted by X, of 30 employees at a local business (in $1000s)

Income	[26, 28]	(28, 30]	(30, 32]	(32, 34]	(34, 36]
Frequency	2	11	8	5	4

The relative cumulative frequency of class **28 < X ≤ 30** class is

A. 11 B. 0.43 C. 0.06 D. 0.37 E. 0.7

Answer: D 11/30 = 0.37

2. Find the mean, median, and mode for the following data set.
4 7 9 11 11 11 13 17 22 26

A. mode = 11, mean = 12, median = 11

B. mode = 11, mean = 11, median = 11

C. mode = 12, mean = 13, median = 11.5

D. mode = 11, mean = 13, median = 11

E. mode = 11.5, mean = 12, median = 11

Answer D

3. A Study of 1106 college students asked about their preference for online resources. The following relative frequency distribution was determined based on the survey.

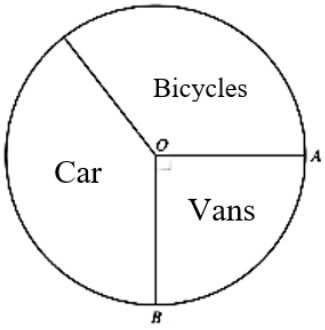
Resource	Relative Frequency
Google or Google Scholar	0.736
Library database or website	0.136
Wikipedia or online encyclopedia	0.094
Other	0.034

How many students prefer Google or Google Scholar?

A. 34 B. 292 C. 736 D. 814 E. 921

Answer: D 0.736*1106 = 814

4. The pie chart above, not drawn to scale, shows the number of vehicles parked outside a supermarket. Angle AOB is the right angle. Given that there were 60 vehicles, how many vans were there?



A. 4 B. 6 C. 12 D. 15 E. 20

Answer: D 60/4 = 15

5. The mean temperature in Glens Falls for the month of February is 23 degrees with a standard deviation of 4.2 degrees. What is the z-score for a temperature of 17 degrees (keeping 3 decimal places)

A. 9.523 B. -1.429 C. 1.429 D. -2.928

Answer: B (17-23)/4.2 = -1.429

6. A scientist obtained a normally distributed population of scores with a mean of 70 and a standard deviation of 10. What proportion of scores do you expect to find the interval between 60 and 80?

A. 1.0 B. 0.50 C. 0.34 D. 0.68

Answer: D.

7. The following is a sample of ages (in months) of 18 children at a daycare.

18, 19, 22, 22, 24, 24, 25, 26, 28, 29, 29, 30, 31, 32, **3**5, 36, 36, 42

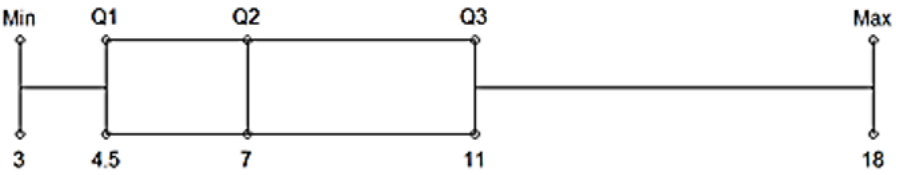
What is the median of the above data set?

A. 29 B. 28.2 C. 30.5 D. 28.5

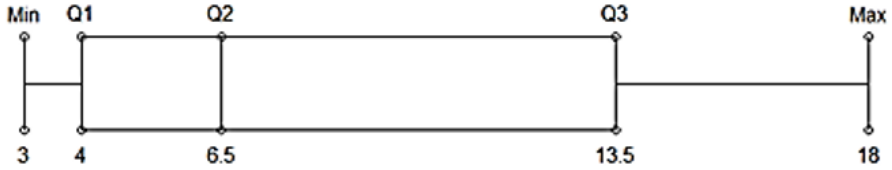
Answer D

8. Construct a boxplot of data set: {3, 4, 4, 5, 5, 6, 8, 10, 10, 12, 15, 18}

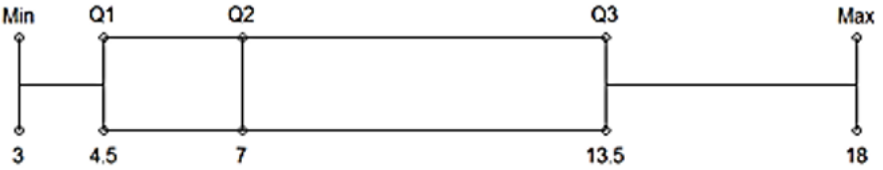
A.



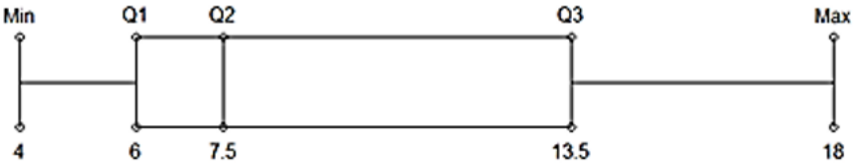
B.



C.



D.



Answer: A

9. Find the variance of the following *sample data set* taken from a population.

   4 11 11 13 15 18

   A. 112/6 B. 112/5 C. 72/6 D. 72/5

   Answer: B

10. A national achievement test is administered annually to 3rd graders. The test score is a continuous random variable that has a mean score of 100 and a standard deviation of 15. What is the probability that a randomly selected student scored 95 on the test? [*Hint: please draw density curves and label the given information and derived information on the curves in the following box*]

    A. 95/100 B. (100-95)/15 C. 0 D. 15/95

Answer: C

11. The scoring of modern IQ is such that intelligence Quotients (IQs) have a normal distribution of $\mu = 100$ and $\sigma = 15$. Mensa International is a non-profit organization that accepts only people with IQ scores in the top 2%. What level of IQ qualifies one to be a member of Mensa? [*Hint: top 2% means 98th percentile*]

A. 115 B. 130.8 C. 145 D. 120

Answer B.

12. The following are 40 measurements of the iron-solution index of tin-plate specimens, designed to measure the corrosion resistance of tin-plated steel. The original data set has been sorted in ascending order as:

16, 26, 28, 28, 28, 28, 30, 32, 34, 35, 36, 36, 37, 37, 40, 40, 40, 41, 41, 41, 42, 42, 42, 43, 43, 43, 44, 44, 44, 44, 45, 45, 45, 45, 45, 45, 46, 46, 46, 46,

We want to Construct a frequency table with five rows. Which of the following histogram is correct?

A)

[15,31]	7
(31,42]	16
(42,53]	17
(53,64]	0
(64,75]	0

B)

[15,25]	1
(25,35]	9
(35,40]	7
(40,45]	19
(45,50]	4

C)

[15,23]	1
(23,31]	6
(31,39]	7
(39,46]	26
(46,53]	0

D)

[15,22]	1
(22,29]	5
(29,36]	6
(36,43]	14
(43,50]	14

Answer D

The Precision Scientific Instrument Company manufactures thermometers that are supposed to give readings of 0°C at the freezing point of water. Tests on a large sample of these instruments reveal that the freezing point of water is around zero (some thermometers give positive degrees, some thermometers give negative degrees), Assume that the mean reading is 0°C and the standard deviation of the readings is 1.00°C. Assume further that the readings are normally distributed. [*Hint: density curves are always helpful*]

13. Randomly select a thermometer, what is the probability the reading of this thermometer in the ice water is bigger than 0.5?

A) 0.5 B) 0.308 C) 0 D) 0.6915

Answer B

14. What is the cut-off reading that 75% of the readings of this type of thermometer in the ice water are higher than this cut-off?

A). 0.75 B) 0.25 C) 0.67 D) – 0.67

Answer C

15. What is the set of all possible outcomes of a probability experiment called?

A) Event
B) Outcome
C) Sample Space
D) Probability

Answer: C

16. When rolling a fair six-sided die, what is the sample space?

A) {1, 3, 5}
B) {2, 4, 6}
C) {1, 2, 3, 4, 5, 6}
D) {even numbers, odd numbers}

Answer C

17. What is the total number of outcomes when flipping three fair coins?

A) 3
B) 6
C) 8
D) 12

Answer: C

18. What is the sample space for tossing a fair coin and rolling a fair die?

A) {H, T, 1, 2, 3, 4, 5, 6}
B) {(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6)}
C) {(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)}
D) {H, T}

Answer: C

19. Consider the given discrete probability distribution. Find the probability that x equals 5.

x	2	5	6	9
$P(x)$	0.09	?	0.23	0.21

A) 0.53 B) 2.65 C) 0.47 D) 2.35

Answer C

20. Use the information in the table to answer the following questions. State the probabilities as fractions and round to the nearest hundredth

	Have Instagram	Don't Have Instagram	Totals
Have Facebook	37	13	50
Don't Have Facebook	65	10	75
Totals	102	23	125

What is the probability someone has Facebook?

A). 37/50 B). 50/125 C). 37/102 D). 13/23

Answer: B

21. Use the information in the table to answer the following questions. State the probabilities as fractions and round to the nearest hundredth.

	Voted	Did not Vote	Totals
Democrat	35	23	58
Republican	57	28	85
Totals	92	51	143

What is the probability someone chosen at random is a Democrat who voted?

A). 35/143 B). 58/143 C). 35/92 D). 35/58

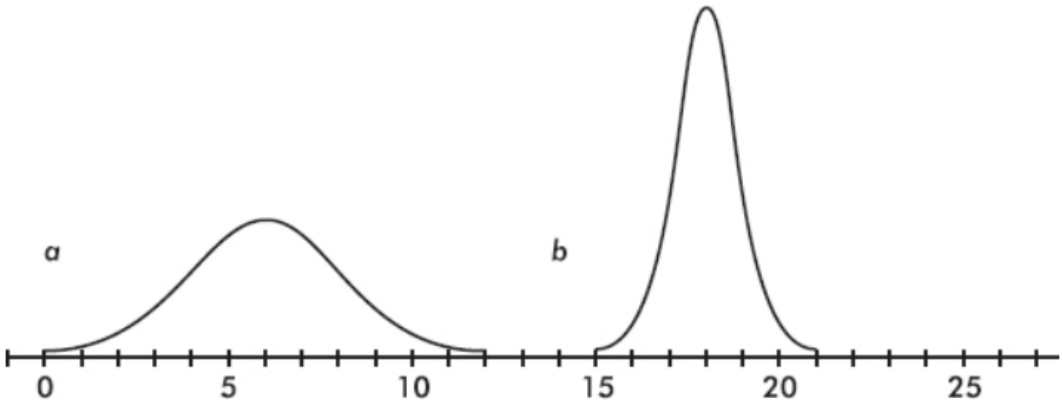
Answer: A

22. Which of the following is a true statement?

A. The area under a normal curve is always equal to 1, no matter what the mean and standard deviation are.
B. All bell-shaped curves are normal distributions for some choice of μ and σ.
C. The smaller the standard deviation of a normal curve, the lower and more spread out the graph.
D. Depending upon the value of the standard deviation, normal curves with different means may be centered around the same number.

Answer A

23. Consider the following two normal curves:



Which has the larger mean and which has the larger standard deviation?

A. Larger mean, a; larger standard deviation, a
B. Larger mean, a; larger standard deviation, b
C. Larger mean, b; larger standard deviation, a
D. Larger mean, b; larger standard deviation, b

Answer C

24. Which of the following is an example of a continuous uniform distribution?

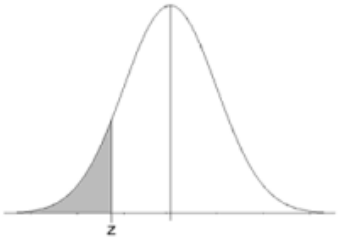
A) The number of heads when flipping a fair coin five times.
B) The outcome of rolling a standard six-sided die.
C) The arrival time of a shuttle train that runs every five minutes.
D) The result of a multiple-choice test with five possible answers chosen at random.

Answer C

25. A shuttle train completes a circuit every five minutes and follows a uniform distribution. What is the probability that a passenger will wait more than three minutes for the train?
A) 1/5
B) 2/5
C) 3/5
D) 1/2

Answer C

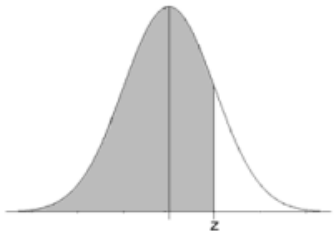
Standard Normal Cumulative Probability Table



Cumulative probabilities for NEGATIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

Standard Normal Cumulative Probability Table



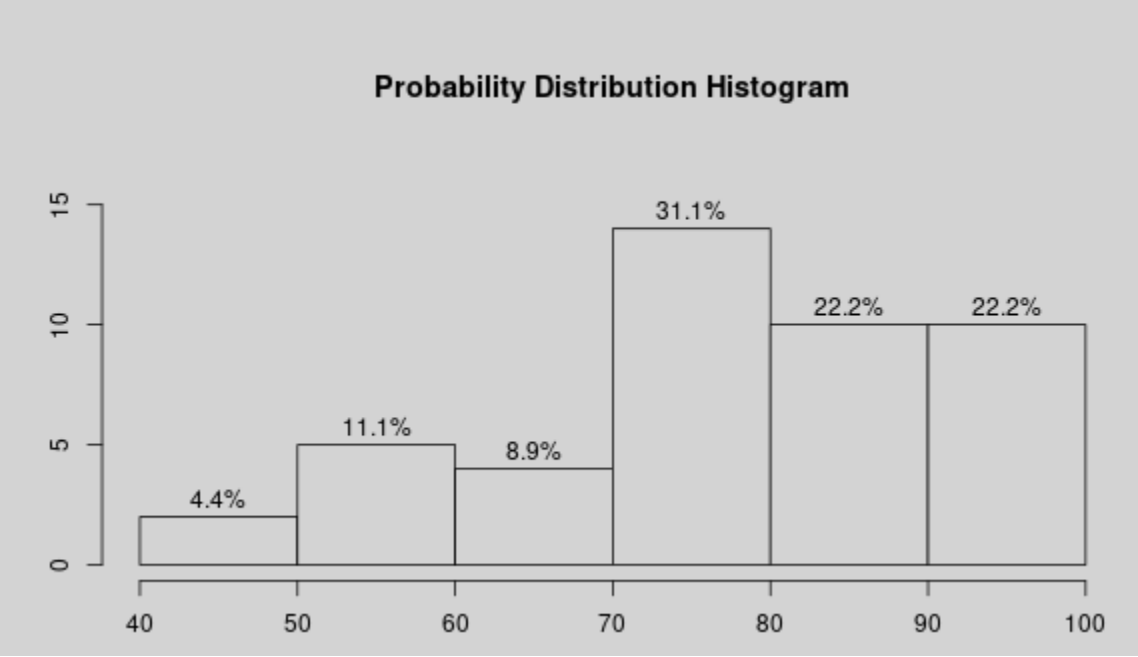
Cumulative probabilities for POSITIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

Summary of Midterm Exam 01

The class boundary is: 40,50,60,70,80,90,100

cut.data.freq	Freq	midpts	rel.freq	cum.freq	rel.cum.freq
[4e+01,5e+01]	2	45.00	0.04	2	0.04
(5e+01,6e+01]	5	55.00	0.11	7	0.16
(6e+01,7e+01]	4	65.00	0.09	11	0.24
(7e+01,8e+01]	14	75.00	0.31	25	0.56
(8e+01,9e+01]	10	85.00	0.22	35	0.78
(9e+01,1e+02]	10	95.00	0.22	45	1.00



The five-number summary of this given data set is:

stats	value
Min.	48.00
1st Qu.	72.00
Median	80.00
3rd Qu.	88.00
Max.	100.00

The boxplot is a geometric representation of the five-number summary. The boxplot of the given data set is given below.