MAT125-02 Intro Stats and Prob

Midterm Exam 01

2/12/2026

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.

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 = 0.3667

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.

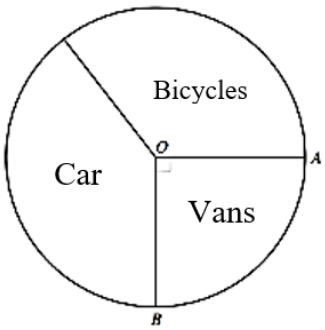
Resource	Relative Frequency
Google or Google Scholar	0.736
Library database or website	0.136
Wikipedia or online encyclopedia	0.094
Other	0.034

How many students prefer Google or Google Scholar?

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

Answer D

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

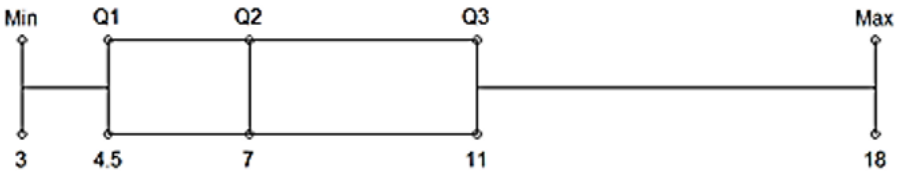
5. The mean temperature in Glens Falls for the month of February is 23 degrees with a standard deviation of 4.2 degrees. What is the z-score for a temperature of 17 degrees (keeping 3 decimal places)

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

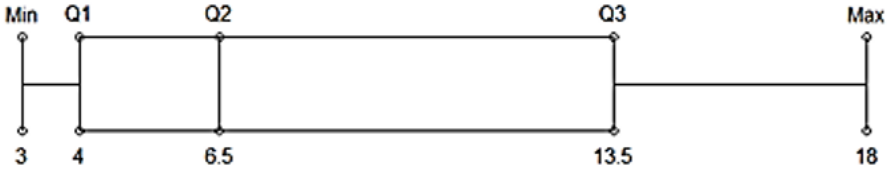
Answer B)

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

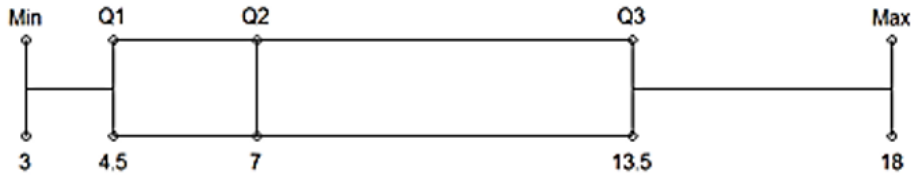
A.

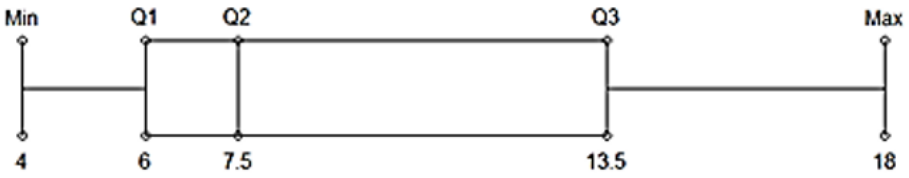


B.



C.





Answer A.

7. A bakery tracks the number of specialty cakes (X) sold in a day. The probability distribution is: P(X=0)=0.1, P(X=1)=0.3, P(X=2)=0.4, P(X=3)=0.2. What is the expected number of specialty cakes sold per day?
   a) 1.5
   b) 1.6
   c) 1.7
   d) 2.0

Answer: c)
E(X) = (0*0.1)+(1*0.3)+(2*0.4)+(3*0.2) = 0 + 0.3 + 0.8 + 0.6 = 1.7

8. A probability distribution is valid only if:
   a) All probabilities are between 0 and 0.5.
   b) The probabilities sum to 1 and each is between 0 and 1 inclusive.
   c) The expected value is a whole number.
   d) The variable has more than two possible values.

Answer: b)

9. Which scenario is BEST modeled by a binomial distribution?
   a) Counting the number of cars arriving at a drive-thru in an hour.
   b) Drawing cards from a deck without replacement until you get an ace.
   c) Flipping a coin 10 times and counting the number of heads.
   d) Measuring the height of randomly selected students.

Answer: c)

10. A basketball player makes 70% of her free throws. She takes 5 independent shots. What is the probability she makes exactly 3? (Use formula: $P(X=k) = n!/[k!(n-k)!]\ p^k\ (1-p)^{(n-k)}$
    a) 0.3087
    b) 0.3430
    c) 0.3602
    d) 0.5282

Answer: a)

n=5, p=0.7, k=3. $P(X=3) = 5!/(3!2!] * (0.7)^3 * (0.3)^2 = 10 * 0.343 * 0.09 = 0.3087$.

11. Ten percent of light bulbs are defective. In a random sample of 8 bulbs, what is the probability that none are defective?

    a) 0.08
    b) 0.4305
    c) 0.5695
    d) 0.9564

Answer: b)
n=8, p=0.1, P(X=0) = (0.9)^8 ≈ 0.430467.

12. If the number of typographical errors on a page follows a Poisson distribution with λ = 1.2, what is the probability a randomly selected page has exactly 2 errors?
    a) 0.2169
    b) 0.2618
    c) 0.3012
    d) 0.3614

Answer: a)
P(X=2) = (e^(-λ) * λ²) / 2! = (e^(-1.2) * 1.44) / 2 ≈ (0.301194 * 1.44) / 2 ≈ 0.21686.

13. Calls to a customer service center follow a Poisson process averaging 3 calls per minute. What is the probability of exactly 5 calls in a 2-minute period?
    a) Use λ=3, k=5
    b) Use λ=5, k=3
    c) Use λ=6, k=5
    d) Use λ=1.5, k=5

Answer: c)
For a 2-minute period, the rate λ becomes (3 calls/min * 2 min) = 6.

14. On average, 2 students miss a statistics class each day. Assuming Poisson, what is the probability that *at least* 1 student is absent on a given day?
    a) 0.1353
    b) 0.2707
    c) 0.5940
    d) 0.8647

Answer: d)
λ=2. P(X>=1) = 1 - P(X=0) = 1 - e^(-2) $\approx$ 1 - 0.1353 = 0.8647.

15. If P(A) = 0.6, P(B) = 0.3, and A and B are mutually exclusive events, what is P(A or B)?
    a) 0.18
    b) 0.9
    c) 0.78
    d) 0.0

Answer: b) For mutually exclusive events, P(A or B) = P(A) + P(B) = 0.6 + 0.3 = 0.9.

16. If P(A) = 0.3 and P(B) = 0.5, and P(A or B) = 0.65, what is P(A and B)?
    a) 0.15
    b) 0.80
    c) 0.20
    d) 0.35

Answer: a) General addition rule: P(A or B) = P(A) + P(B) - P(A and B). 0.65 = 0.3 + 0.5 - P(A and B). So P(A and B) = 0.8 - 0.65 = 0.15.

17. A newsstand finds that among its customers, the probability of buying a Fashion magazine is 0.4, the probability of buying a Sports magazine is 0.25, and the probability of buying neither is 0.45. What is the probability a customer buys both?
    a) 0.10
    b) 0.65
    c) 0.30
    d) 0.05

    Answer: a)
    Step 1: P(Buys at least one) = 1 - P(Buys neither) = 1 - 0.45 = 0.55.
    Step 2: Use the general addition rule: P(F or S) = P(F) + P(S) - P(F and S).
    So, 0.55 = 0.40 + 0.25 - P(F and S).
    0.55 = 0.65 - P(F and S).
    Therefore, P(F and S) = 0.65 - 0.55 = 0.10.

18. Use the standard normal distribution table to find P(0 < z < 2.25).
    A) .8817 B) .5122 C) .4878 D) .7888

Answer C)

19. Use a table of areas to find the area that lies to the ***right*** of 0.59 under the standard normal curve.
A) 0.2190 B) 0.2776 C) 0.7224 D) 0.2224

Answer B)

20. Find a value of the standard normal random variable z, called z_0, such that $P(z \geq z_0) = 0.70$.

A) -.47 B) -.98 C) -.81 D) -.53

Answer: D)

21. The body temperatures of healthy adults follow a normal distribution with a mean of 36.8° C and a standard deviation of 0.40°C. About what percent of body temperatures are above 37.6°C? [*Hint: choose the one that is closest to your answer*]

A) 95%
B) 5%
C) 2.5%
D) 68%

Answer: C)

22. The daily minimum temperature in a city during January is normally distributed with a mean of -15.1°C and a standard deviation of 6.2 °C Problem: What is the probability that a randomly chosen day has a minimum temperature above 0 °C

A) 0.0074 B) 0.4916 C) 0.9916 D) 0.0500

Answer: A)
Explanation: Calculate z=[0-(-15.1)]/6.2} = 2.44. The probability of Z>2.44 is approximately 1-0.9926=0.0074.

23. A drug's effective dose is normally distributed with a mean of 50 mg and a standard deviation of 6 mg. What percentage of patients require more than 62 mg for the drug to be effective?
A) 2.28%
B) 4.55%
C) 47.72%
D) 97.72%

Answer: A) 2.28%
Explanation: $z = (62 - 50)/6 = 2$. $P(Z > 2) \approx 0.0228$ or 2.28%.

24. Bolts produced have lengths normally distributed with mean 15 cm and standard deviation 0.2 cm. If specifications of good quality require lengths between 14.7 cm and 15.3 cm, what percentage are *defective*?
A) 6.68%
B) 93.32%
C) 13.36%
D) 86.64%

Answer: C)
Explanation: $z_1 = (14.7 - 15)/0.2 = -1.5$, $z_2 = 1.5$. Proportion within = $P(-1.5 < Z < 1.5) \approx 0.8664$, so defective = $1 - 0.8664 = 0.1336$ → 13.36%. Answer is **C) 13.36%**.

25. Annual rainfall in a city is normal with mean 40 inches and σ = 6 inches. What is the probability of getting exactly 50 inches in a year?
a) 4.75%
b) 9.18%
c) 0%
d) 15.87%

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

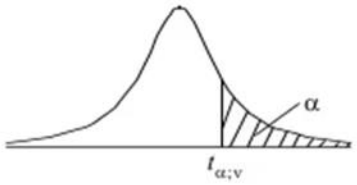
Standard Normal Cumulative Probability Table

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

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha;\nu}$ where
$\Pr(T_\nu > t_{\alpha;\nu}) = \alpha$, with ν degrees of freedom



ν \ α	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291