UNIVERSITI KUALA LUMPUR
BUSINESS SCHOOL

FINAL EXAMINATION
FEBRUARY 2025 SEMESTER

COURSE CODE	:	**EBP00302**
COURSE NAME	:	**INTRODUCTION TO BUSINESS STATISTICS**
PROGRAMME NAME	:	**FOUNDATION IN BUSINESS (FIB)**
DATE	:	**23 JUNE 2025**
TIME	:	**9.00 AM – 12.00 PM**
DURATION	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. **Please CAREFULLY read the instructions given in the question paper.**
2. **This question paper has information printed on both sides of the paper.**
3. This question paper consists of **TWO (2) Sections; Section A and Section B**.
4. Answer **ALL** questions in **Section A and Section B**.
5. Please write your answers on the OMR answer sheet and answer booklet provided.
6. All questions must be answered in **English** (any other language is not allowed).
7. **This question paper must not be removed from the examination hall.**
8. **Formulas and Z-tables have been appended for your reference.**

THERE ARE ELEVEN (11) PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.

Please use the objective answer sheet provided.

1. In the context of statistical studies, ***sample*** refer to:
   A. The method used to collect data
   B. A numerical summary of a population
   C. A parameter describing the entire population
   D. A partial collection of observations taken from a population

2. Which of the following best defines a ***population*** in statistics?
   A. A group of people living in a particular area
   B. A subset of data used for analysis
   C. The entire set of individuals or items of interest in a study
   D. A numerical measure that describes a sample

3. Define the best example of ***descriptive statistics.***
   A. Calculating the average height of students in a class
   B. Using sample data to estimate the population mean
   C. Predicting future sales using past data
   D. Conducting a hypothesis test

4. The main goal of ***inferential statistics*** is to:
   A. Organize and summarize data
   B. Describe patterns in a sample
   C. Make predictions about a population based on a sample
   D. Display data using graphs

5. During a school survey, the teacher asks students to mention their favorite subject, such as Math, Science, or History. The responses are recorded for analysis. Identify type of data that being collected.
   A. Discrete Data
   B. Continuous Data
   C. Quantitative Data
   D. Qualitative Data

6. A university wants to study student satisfaction with cafeteria food. They randomly select 10 students from each department. Name the sampling method is being used.
   A. Systematic sampling
   B. Stratified sampling
   C. Simple random sampling
   D. Cluster sampling

7. A researcher stands at the entrance of a shopping mall and asks the first 50 people who walk by to answer a few questions for a study. This is an example of:
   A. Cluster sampling
   B. Convenience Sampling
   C. Systematic sampling.
   D. Stratified sampling.

8. A professor wants to investigate social media usage among university students. She sends a survey link to students she teaches and asks them to forward it to their friends. Determine the sampling method that she used.
   A. Simple random sampling
   B. Systematic sampling
   C. Convenience Sampling
   D. Judgemental Sampling

9. The best describes the term ***data collection*** in statistics is
   A. The process of arranging data in tables and charts
   B. The method of drawing conclusions based on data
   C. The technique used to eliminate errors in data
   D. The process of gathering and measuring information on variables of interest

10. A marketing student wants to study consumer behavior in a supermarket. She goes to the store and discreetly records how customers interact with different product displays. Find the method used.
   A. Surveys
   B. Interviews
   C. Observation
   D. Experimentation

11. Name the plot used in statistics to show cumulative frequency.

A. Bar graph
B. Histogram
C. Ogive
D. Frequency polygon

12. A professor recorded the number of students receiving each grade in a class and created the following relative frequency table:

Grade	Number of Students	Relative Frequency
A	10	0.25
B	15	0.375
C	8	0.20
D	5	0.125
F	2	0.05

Determine the percentage of students received a grade of B.

A. 12.5%
B. 37.5%
C. 25%
D. 50%

13. A student created a chart to show how she spends her monthly allowance: 40% on food, 25% on books, 20% on entertainment, and 15% on savings. Each category is shown as a slice of a circle. Identify the chart type that she used.

A. Pie chart
B. Bar chart
C. Histogram
D. Frequency polygon

14. The following frequency table shows the number of books read by students in a month:

Number of Books	1	2	3	4	5
Frequency	2	4	5	3	1

Find the median number of books read.

A. 2
B. 4
C. 3
D. 5

15. Calculate the mean value for the ages of 5 children in a group below:

8, 10, 12, 10, 15

A. 11
B. 12
C. 13
D. 14

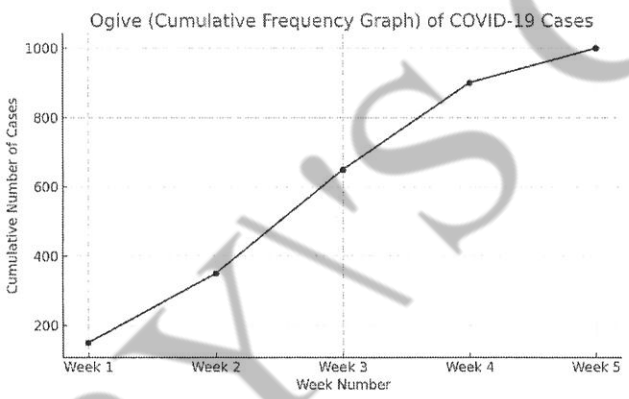
16. The following stem-and-leaf plot shows the ages of a group of employees:

Stem	Leaf
1	5 8
2	0 3 3 7
3	1 4 4 4
4	6
5	2 8

For the above stem and leaf plot, what is the mode of the ages?

A. 4
B. 23
C. 20
D. 34

17. Refer to the ogive graph below, which shows the cumulative number of COVID-19 cases reported over five weeks.



According to the ogive, by the end of Week 3, how many cumulative COVID-19 cases had been reported?

A. 1000
B. 650
C. 850
D. 350

18. Interpret the correct general formula to find the mean of ungrouped data with frequencies.

A. Total frequency divided by total of the values
B. Total of the values divided by the number of items
C. Total of the squares of the values divided by total frequency
D. Total of the product of values and frequencies divided by total frequency

19. In statistics, describes the purpose of a measure of dispersion.

A. To determine how spread out the data values are around the center
B. To find the most frequently occurring value in a dataset
C. To describe the central tendency of a dataset
D. To calculate the total sum of all data values

20. In a dataset where the mean is greater than the median and mode, what can be inferred about the skewness of the distribution?

A. The distribution is symmetric
B. The distribution is negatively skewed
C. The distribution is positively skewed
D. There is no skewness in the distribution

21. A dataset has the following characteristics:.

- Mean = 40
- Mode = 50
- Standard Deviation = 10

Using Pearson's Coefficient of Skewness, calculate the skewness of the dataset.

A. The distribution is symmetric
B. The distribution is negatively skewed
C. The distribution is positively skewed
D. There is no skewness in the distribution

22. A fair coin is tossed twice. Identify the correctly sets represents the sample space for this experiment.

A. {H, T}
B. {2H, 1H1T, 2T}
C. {HH, HT, TH, TT}
D. {HHTT, TTHH}

23. Which of the following statements is true about mutually exclusive events?

A. Two events are mutually exclusive if they can occur at the same time.
B. If two events are mutually exclusive, the probability of both events occurring simultaneously is zero.
C. Two events are mutually exclusive if the occurrence of one event increases the probability of the other event.
D. Mutually exclusive events can have overlapping outcomes, but their probabilities add up to 1.

24. In a bag, there are 3 red balls, 2 blue balls, and 5 green balls. A ball is randomly selected from the bag. Find the probability that the ball selected is either red or blue.

A. 0.5
B. 0.6
C. 0.2
D. 0.05

25. Calculate the probability if P(A)=0.4, P(B)=0.5, and events A and B are independent.

A. 0.2
C. 0.4
B. 0.9
D. 0.5

26. Identify which situations would NOT be effectively represented by a tree diagram.

A. A series of weather predictions (sunny, cloudy, rainy) over three days
B. Choosing a marble from a bag without replacement multiple times
C. Rolling two dice simultaneously
D. Selecting a card from a deck of cards

27. A teacher randomly selects one student from a list of 20 students. If 8 of them are girls, what is the probability that the selected student is **NOT** a girl?.

A. 0.2
C. 0.6
B. 0.4
D. 0.8

28. A survey of 100 students was conducted to find out their preferred mode of transport to school. The data is shown below:

	Bus	**Bicycle**	**Walk**	**Total**
Boys	20	10	10	40
Girls	15	20	25	60
Total	35	30	35	100

If one student is selected at random, find the probability that the student is a **girl who walks** to school.

A. 10/100
C. 20/100
B. 15/100
D. 25/100

29. Identify the characteristic of a discrete random variable.

A. It can take any value within a given interval
B. It takes on a countable number of distinct values
C. It is always associated with continuous data
D. It has an uncountable range of values

30. Determine the formula to calculate the variance of a random variable X.

A. $Var(X) = \sum x * P(x)$
B. $Var(X) = E(x) * P(x)$
C. $Var(X) = E(x) - [E(x)]^2$
D. $Var(X) = E(x^2) - [E(x)]^2$

31. The table represents the probability of guessing correct on a 3 question true-false quiz. Find the probability for exactly 2 questions correct.

x	P(x)
1	0.25
2	0.125
3	0.625

A. 0.125
B. 0.25
C. 0.526
D. 1.000

32. x = {0, 1, 2, 3} is a random variable with probability distribution function

x	0	1	2	3
P(x)	0.2	**y**	0.5	0.1

Find the value of **y**.
A. 0.1
B. 0.2
C. 0.3
D. 0.5

33. The probability mass function of a discrete random variable X is given below:

X	1	2	3	4
P(X)	0.1	0.3	0.4	0.2

Calculate the expected value E(X) of the random variable X.
A. 1.0
B. 1.7
C. 2.7
D. 2.0

34. A quality inspector checks 10 light bulbs. Each has a 0.1 probability of being defective. Find the probability exactly 2 bulbs are defective.
A. 0.1937
B. 0.2639
C. 0.3874
D. 0.7361

35. If a binomial distribution has parameters n=20 and p=0.4, determine the value for mean and variance.
A. Mean = 12, Variance = 6
B. Mean = 10, Variance = 5
C. Mean = 8, Variance = 3.2
D. Mean = 8, Variance = 4.8

36. Describe correctly about a normal distribution.

A. It is always skewed to the right

B. Its mean, median, and mode are all equal

C. It has two distinct peaks

D. The total area under the curve is less than 1

37. A student scored 85 on a test where the mean score was 75 and the standard deviation was 5. Find the z-score of the student's result.

A. 1.5

B. 2.5

C. 2.0

D. 3.0

38. In a population of adult males, heights are normally distributed with a mean of 175 cm and a standard deviation of 10 cm. Determine the probability of men are taller than 185 cm.

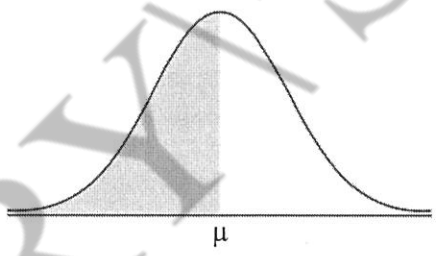
A. 0.1587

B. 0.3085

C. 0.6915

D. 0.8413

39. From the diagram below, identify the shaded area in the distribution below.



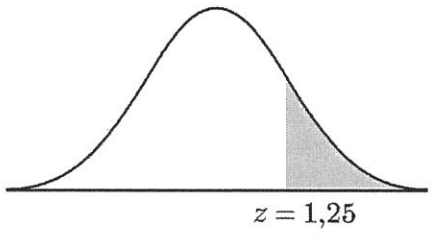
A. $P(X<\mu)$

B. $P(X>\mu)$

C. $P(X=\mu)$

D. $P(X\geq\mu)$

40. Find the area of the shaded region given z = 1.25.



A. 0.4013

B. 0.1056

C. 0.7753

D. 0.8944

SECTION B (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

A researcher was conducted to study the amount of money spent on transportation by students in the Foundation in Business at UniKL. Three classes were randomly selected from five classes and each student from the selected class was studied.

(a) State the population and sample for the above study.

(2 marks)

(b) State the sampling frame of the study.

(2 marks)

(c) Identify the variable of interest and state its type.

(2 marks)

(d) Name the most appropriate sampling technique that can used.

(2 marks)

(e) Determine the most appropriate method of data collection. State ONE advantage of the method.

(2 marks)

Question 2

The table below shows the production efficiency scores of poultry egg farming using system A by 35 farmers.

Score	Number of farmers
0.70 – 0.75	2
0.75 – 0.80	5
0.80 – 0.85	8
0.85 – 0.90	7
0.90 – 0.95	10
0.95 – 1.00	3

(a) Calculate the value of mean for the above data.

(3 marks)

(b) Find the median for the production efficiency scores above.

(4 marks)

(c) Determine the mode for the above data and interpret the value obtained.

(4 marks)

(d) Using the value mean, median and mode, determine the skewness for the production scores.

(3 marks)

Question 3

A milk producer company tested on their latest formula of N milk powder to prevent allergy for new born babies in a particular hospital. The probability for a baby feeding on milk powder in the hospital 0.3. After giving the N milk powder to the babies, the probability for a baby getting an allergy is 0.2. Meanwhile, babies which have not been fed with N milk powder have a probability of 0.6 of getting and allergy.

(a) Construct a tree diagram to represent above information.

(6 marks)

(b) Estimate the probability that a baby selected an allergy.

(3 marks)

(c) If the baby not gets an allergy, estimate the probability that N milk powder is given.

(4 marks)

Question 4

X = {0, 2, 4, 6} is a random variable with probability distribution:

X	0	2	4	6
P(X)	0.20	0.35	0.30	0.15

(a) Find the probability that X is at least 4.

(2 marks)

(b) Calculate E(x).

(2 marks)

(c) Calculate Var(x).

(4 marks)

Question 5

(a) A production executive found that 10% of the rice cookers manufacture are defective. If 20 rice cookers are selected randomly, find the probability less than 2 are defective.

(5 marks)

(b) If $X \sim N(400,225)$, find $P(X < 405)$.

(5 marks)

(c) A marine company hires out boats on a daily basis. The mean number of boats hired per day is 18 and standard deviation 6. For a period of 120 days, find how many days were there between 8 and 12 boats hired?

(5 marks)

END OF EXAMINATION PAPER

FORMULA - BUSINESS STATISTICS FOR FOUNDATION PROGRAM

1. Number of classes (K) for a given number of observations (n) is $K = \frac{\log n}{\log 2} = \frac{\log n}{0.301}$

2. Class Width = $(\frac{\text{Largest Number} - \text{Smallest Number}}{k})$

3. Relative Frequency = $\frac{\text{Frequency}}{Total\ frequency}$

4. Mean for grouped data

$$\bar{x} = \frac{\sum fx}{\sum f}$$

5. Median or Q_2 for grouped data =

$$\tilde{x} = L_m + \left[\frac{(\frac{n}{2}) - \Sigma f_{m-1}}{fm}\right] x\ C_m$$

6. Mode for grouped data =

$$\hat{x} = L_{mode} + \left[\frac{\triangle 1}{\triangle 1 + \triangle 2}\right] x\ C_{mode}$$

7. Positions for Quartiles, ungrouped data

$P.Q1 = \frac{n+1}{4}$. $Q1 = ?$

$P.Q2\ or\ Median = \frac{n+1}{2}$ $Q2 = ?$

$P.Q3 = \frac{3(n+1)}{4}$ $Q3 = ?$

8. Positions for Quartiles, grouped data

$P.Q1 = \frac{n}{4}$

$P.Q2\ or\ Median = \frac{n}{2}$

$P.Q3 = \frac{3(n)}{4}$

9. Q1 and Q3 for grouped data

$$Q_1 = L_{Q1} + \left[\frac{(\frac{n}{4}) - \Sigma f_{Q1-1}}{f1}\right] x\ C_{Q1}$$

$$Q_3 = L_{Q3} + \left[\frac{(\frac{3n}{4}) - \Sigma f_{Q3-1}}{f3}\right] x\ C_{Q3}$$

10. Range = Maximum Value – Minimum Value
11. Interquartile Range = Q3- Q1
12. Quartile Deviation = $\frac{Q3-Q1}{2}$

13 Variance:

a) Ungrouped data

$$\sigma^2 = \frac{(1\sum X^2)}{N} - (\mu)^2 \text{ where } \mu = \frac{\sum x}{N}$$

b) Ungrouped with frequency/Grouped data

$$\sigma^2 = \frac{(\sum fX^2)}{\sum f} - (\mu)^2 \text{ where } \mu = \frac{\sum fx}{\sum f}$$

14. Coefficient of Variation: CV

$$= \left(\frac{\text{Standard Deviation}}{\text{Mean}}\right) x100\%$$

15. Skewness: PCS = $\frac{\bar{x} - \hat{x}}{s}$ or PCS = $\frac{3(\bar{x} - \tilde{x})}{s}$

16. Probability of an Event:

a) $P(A) = \frac{\text{Number of Elements in } A}{\text{Number of Elements in } S}$

b) Let A and B be any two events defined. from a given sample space S, then:
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

c) If A and B are mutually exclusive events, then $P(A \cup B) = P(A) + P(B)$

d) If A' is the complement of event A and they are defined from the same S, then:
$P(A') = 1 - P(A)$

e) If A and B are two defined events from the same sample space S, then the probability of conditional event B|A is given by:

$$P(B|\mathbf{A}) = \frac{P(B \cap A)}{P(\mathbf{A})}$$

Since $B \cap A = A \cap B$, we also have

$$P(A|\mathbf{B}) = \frac{P(B \cap A)}{P(\mathbf{B})}$$

f) The multiplication rule of two independent events becomes: $P(A \cap B) = P(A) \times P(B)$

17. The probablity of a continuous random variable X with its probability density function $f(x)$ is given by: $P(a < X < b) = \int_a^b f(x)\,dx$

18. The mean of a discrete random variable X with its probability distribution function is given by:

$$\mu = E(X)$$
$$E(X) = \sum(Xi \,.\, P(Xi))$$

19. The mean of a continuous random variable X with its probability density function $f(x)$ is given by:

$$\mu = E(X)$$
$$E(X) = \int_{-\infty}^{\infty} X \,.\, f(x)\,dx$$

20. The variance and standard deviation of the discrete random variable distribution is given by one the following formulas:

$$Var\,(X) = \sigma^2 = E(X^2) - E(X)^2$$

where $E(X^2) = \sum X_i^2 \times P(X_i)$

Standard Deviation is given by: $\sigma = \sqrt{\sigma^2}$

21. The variance and standard deviation of the continuous random variable distribution is given by one the following formulas:

$$Var\,(X) = \sigma^2 = E(X^2) - E(X)^2$$

where $E(X^2) = \int_{-\infty}^{\infty} x^2 . f(x) dx)$

Standard Deviation is given by: $\sigma = \sqrt{\sigma^2}$

22. Let X be a discrete random variable representing the total number of successes in a binomial experiment with n repetitions of Bernoulli trials. Then the probability of x is given by:

$$P(X=x) = {}^{n}_{x}C\ p^x q^{n-x} = \frac{n!}{x!(n-x)!}\,p^x q^{n-x}$$

where $P(X)$ = the probabilities of x successes in a trial:

n = number of trials

p = probability of success of any trial

q = probability of failure (1-p)

23. The mean and variance of Binomial Distribution:

Mean: $\mu = n\,p$

Variance: $\sigma^2 = np\,(1-p) = n \times p \times q$

$$\sigma = \sqrt{np\,(1-p)}$$

24. Let X be a continuous random variable from a normal distribution ,then X can be transformed to Z score of standard normal distribution by following formula :

$$Z = \frac{x-\mu}{\sigma}\ .$$

UPPER TAIL PROBABILITIES OF THE NORMAL DISTRIBUTION N(0, 1)

z	0	1	2	3	4	5	6	7	8	9	1 2 3 4 5 6 7 8 9 SUBTRACT
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4 8 12 16 20 24 28 32 36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4682	.4247	4 8 12 16 20 24 28 32 36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4 8 12 15 19 23 27 31 35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4 7 11 15 19 2 26 30 34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4 7 11 14 18 22 25 29 32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3 7 10 14 17 20 24 27 31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3 7 10 13 16 19 23 26 29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3 6 9 12 15 18 21 24 27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3 5 8 11 14 16 19 22 25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3 5 8 10 13 15 18 20 23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2 5 7 9 12 14 16 19 21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2 4 6 8 10 12 14 16 18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2 4 6 7 9 11 13 15 17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2 3 5 6 8 10 11 13 14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1 3 4 6 7 8 10 11 13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1 2 4 5 6 7 8 10 11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1 2 3 4 5 6 7 8 9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1 2 3 4 4 5 6 7 8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1 1 2 3 4 4 5 6 6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1 1 2 2 3 4 4 5 5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0 1 1 2 2 3 3 4 4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0 1 1 2 2 2 3 3 4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0 1 1 1 2 2 2 3 3
2.3	.0107	.0104	.0102								0 1 1 1 1 2 2 2 2
				.00990	.00964	.00939	.00914				3 5 8 10 13 15 18 20 23
								.00889	.00866	.00842	2 5 7 9 12 14 16 18 21
2.4	.00820	.00798	.00776	.00755	.00734						2 4 6 8 11 13 15 17 19
						.00714	.00695	.00676	.00657	.00639	2 4 6 7 9 11 13 15 17
2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480	2 3 5 6 8 9 11 12 14
2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357	1 2 3 5 6 7 8 9 10
2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264	1 2 3 4 5 6 7 8 9
2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193	1 1 2 3 4 4 5 6 6
2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139	0 1 1 2 2 3 3 4 4
3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100	0 1 1 2 2 2 3 3 4
3.1	.000968	.000935	.000904								3 6 9 13 16 19 22 25 28
				.000874	.000845	.000816	.000789				3 6 8 11 14 17 20 22 25
								.000762	.000736	.000711	2 5 7 10 12 15 17 20 22
3.2	.000687	.000664	.000641	.000619	.000598						2 4 7 9 11 13 15 18 20
						.000577	.000557	.000538	.000519	.000501	2 4 6 8 9 11 13 15 17
3.3	.000483	.000466	.000450	.000434	.000419						2 3 5 6 8 10 11 13 14
						.000404	.000390	.000376	.000362	.000349	1 3 4 5 7 8 9 10 12
3.4	.000337	.000325	.000313	.000302	.000291	.000280	.000270	.000260	.000251	.000242	1 2 3 4 5 6 7 8 9