Second Semester Examination
2018/2019 Academic Session

June 2019

EEM421 – Quality Techniques
(Kaedah Kualiti)

Duration : 3 hours
(Masa : 3 jam)

Please check that this examination paper consists of THIRTEEN (13) pages and THREE (3) appendices page of printed material before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi TIGA BELAS (13) muka surat dan TIGA (3) lampiran yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions : This paper consists of **FIVE (5)** questions. Answer **FIVE (5)** questions.

*[**Arahan** : Kertas ini mengandungi **LIMA (5)** soalan. Jawab **LIMA (5)** soalan.]*

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunapakai.]

1. The Seven Basic Quality Tools is a designation given to a fixed set of graphical techniques identified as being most helpful in troubleshooting issues related to quality. They are called basic because they are suitable for people with little formal training in statistics and because they can be used to solve the vast majority of quality-related issues.

Tujuh teknik asas kualiti ialah sebuah penunjukan yang diberikan kepada satu set teknik graf yang dikenal pasti paling berguna untuk menyelesaikan masalah berkaitan kualiti. Teknik-teknik tersebut disebut asas kerana sesuai dengan mereka yang mempunyai latihan statistik formal yang sedikit dan boleh digunakan untuk menyelesaikan majoriti isu-isu kualiti.

(a) List three basic quality tools that can be used to identify the main problem of a general quality-related issue, and describe each of them.

Senaraikan tiga teknik asas kualiti yang boleh digunakan untuk mengenal pasti masalah utama sebuah isu berkaitan kualiti yang umum, dan terangkan setiap teknik tersebut.

(30 marks/*markah*)

(b) The G Electronic Company has just produced a new motion sensor for GSM-based home security system. Before the product is released to the market, it has to undergo some quality control and testing. An experiment has been designed to estimate the “HIGH” state duration of the sensor when a human walks towards it. Several trials have been done and all the durations have been recorded in Table 1.

Syarikat G Electronic baru sahaja menghasilkan pengesan gerakan baharu untuk sistem keselamatan rumah berasaskan GSM. Sebelum produk tersebut dikeluarkan ke pasaran, ia perlu melalui beberapa kawalan kualiti dan ujian. Sebuah eksperimen telah direka untuk menganggarkan tempoh keadaan “TINGGI” pengesan tersebut apabila seorang manusia berjalan ke arahnya. Beberapa percubaan telah dilakukan dan kesemua tempoh tersebut telah direkod di dalam Jadual 1.

4.51	8.5	4.19	2.29
5.96	3.49	2.25	3.45
4.89	5.25	5.36	6.3
7.28	5.25	4.29	5.25
3.96	6.79	4.66	6.5
8.22	2.56	5.25	3.33
5.55	4.90	6.10	2.49
5.25	5.40	6.5	5.25
4.10	6.11	5.25	4.56
5.70	5.25	5.00	5.25

Table 1: Duration of "HIGH" state in seconds.

Jadual 1: Tempoh keadaan "TINGGI" dalam saat.

Use a suitable basic quality tool that can help the company to see the performance of the new sensor, and describe how the company can use the data to complete its datasheet.

Gunakan satu teknik asas kualiti yang sesuai yang dapat membantu syarikat tersebut melihat prestasi pengesan baharu tersebut, dan terangkan bagaimana syarikat itu boleh menggunakan data tersebut untuk melengkapkan lembaran data pengesan tersebut.

(35 marks/*markah*)

(c) What is the capability index for Six-Sigma process? Support your answer by drawing appropriate figure and explain why it is useful.

Apakah indeks kebolehan untuk proses Six-Sigma? Sokong jawapan anda dengan melukis rajah yang bersesuaian dan terangkan kenapa ia berguna.

(10 marks/*markah*)

(d) Tolerances for a capacitor are 70 pF +/- .01 pF. The current process produces capacitors with a mean capacitance of 70.001 pF and a population standard deviation of 0.004 pF. The process population is normally distributed.

Toleransi sebuah kapasitor adalah 70 pF +/- .01 pF*. Proses semasa menghasilkan kapasitor dengan purata* 70.001 pF *dengan sisihan piawai* 0.004 pF*. Proses tersebut mempunyai taburan normal.*

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(i) Is the process capable?

Adakah proses tersebut berkebolehan?

(5 marks/*markah*)

(ii) What proportion will meet specifications? Sketch the distribution to visualize your answer.

Berapakan bahagian yang memenuhi spesifikasi?Lakarkan taburan tersebut untuk menggambarkan jawapan anda.

(20 marks/*markah*)

2. (a) Assume that you are part of a team project working on a software, and you have written a C++ code as shown in Figure 2.1.

Andaikan anda adalah sebahagian daripada kumpulan projek yang sedang membuat perisian, dan anda telah menulis kod C++ seperti yang ditunjukkan di dalam Rajah 2.1.

```
#include <iostream>
using namespace std;
int d;

int main ()
{
  for( int a = 1, b = 10, c = 1 ; a < 10; a = a + 1, b = b - 1, c = c * 2 )
  {
     cout << "value of b: " << b << endl;
     cout << "value of c: " << c << endl;

  if (b<=5)
  {
  d=b^2;
  }
  else
  {
  d=0;
  }
   cout << "value of d: " << d << endl;
}
  return 0;
}
```

Figure 2.1: The code

Rajah 2.1: Kod

Describe how you can explain the code via one of the basic quality tools to your other team members who know nothing about the programming, and show the corresponding output of the code.

Perincikan bagaimana anda boleh menerangkan kod tersebut melalui salah satu teknik asas kualiti kepada ahli-ahli kumpulan yang lain yang tidak tahu berkenaan pengaturcaraan, dan tunjukkan keluaran yang berkaitan dengan kod tersebut.

(40 marks/*markah*)

(b) A company manager wishes to find out whether there is a relationship between the age of his employees and number of sick days they take each year. The data for the sample are shown in Table 2.1.

Seorang pengurus sebuah syarikat hendak mengetahui hubungan antara umur pekerja-pekerjanya dan bilangan hari cuti sakit yang diambil setiap tahun. Data untuk sampel tersebut ditunjukkan di dalam Jadual 2.1.

Employee	Age (years)	Number of Sick Days
1	25	16
2	30	11
3	29	15
4	40	7
5	27	15
6	35	9
7	39	8
8	26	13
9	42	7
10	50	5
11	49	6
12	43	8
13	31	14
14	34	12
15	25	16

Table 2.1: Sick Leave Data from 15 employees

Jadual 2.1: Data hari cuti sakit daripada 15 pekerja

Use an appropriate basic quality tool to graphically show the relationship between the age of the employes and the number of sick days, and calculate the correlation between the two.

Gunakan satu teknik asas kualiti yang sesuai untuk menggambarkan hubungan melalui graf antara umur dan bilangan hari sakit, dan kirakan korelasi antara keduanya.

(30 marks/*markah*)

(c) Bookworm Inc., which is a new bookstore company, is facing a major problem where the book sales are declining. One of the employers, Mr Smith, has taken the initiative to collect all the feedbacks from the customers through an online service. All the complaints are listed as in Table 2.2.

Bookworm Inc., sebuah syarikat baru, sedang meghadapi masalah utama di mana jualan buku-bukunya semakin merosot. Salah seorang daripada pekerjanya, En Smith, telah mengambil inisiatif untuk mengumpulkan semua maklum balas dari para pelanggan melalui khidmat atas talian. Semua aduan telah disenaraikan seperti di dalam Jadual 2.2.

No.	Complaints	Number
1	Parking difficulties	4
2	No Wi-fi	10
3	Salesmen are not helpful	25
4	No reading sections	5
5	Salesmen too slow	15
6	Internet coverage is poor	10
7	Types of books not arranged properly	6
8	Salesmen are rude	9
9	Poor lighting	9
10	Limited types of books	16
11	No books for toddlers	8
12	Kids book sections should be in one place	10
13	Interior Layout confusing	4
14	No latest books	6
15	No online delivery	21
16	No Online Apps to search for books	23
17	School books need to be in one place	3

18	Should sell "used books" too	13
19	No washroom	8
20	Hard to find the salesmen	19
21	Cannot use credit/debit cards for payment	7
22	No list of books can be viewed online	20
23	Store address on website is not up to date, hard to find it in Google Map	15

Table 2.2: Customer complaints received by Bookworm Inc in 2018.

Jadual 2.2: Aduan pelanggan yang diterima oleh Bookworm Inc pada tahun 2018.

Based on Table 2.2, categorize the complaints into 6 main problems, and construct a Pareto chart.

Berdasarkan Jadual 2, bahagikan kesemua aduan kepada 6 kategori, dan bina carta Pareto.

(30 marks/*markah*)

3. (a) With the importance of quality in international competition, and the demonstrated success of those companies that have been able to produce products of high quality, one must conclude that 'design for sustainability is very important. Briefly describe the term *"Design for sustainability" and give an example of a product with "Design for sustainability" approach.*

Dengan kepentingan kualiti dalam pertandingan antarabangsa, dan kejayaan yang ditunjukkan oleh syarikat-syarikat yang telah dapat menghasilkan produk yang berkualiti tinggi, secara kesimpulannya 'reka bentuk untuk kelestarian' adalah sangat penting.

Terangkan secara ringkas 'Rekabentuk untuk Kelestarian" dan nyatakan satu contoh produk yang menggunakan cara 'Rekabentuk untuk Kelestarian"

(20 marks/*markah*)

(b) Product development is an interdisciplinary activity requiring contribution from the three functions in design and development aspects. Identify the two functions in product design and development. Then, suggest an example of a product and describe its process planning.

Pembangunan produk adalah aktiviti interdisiplin yang memerlukan sumbangan daripada tiga fungsi dalam aspek reka bentuk dan pembangunan. Kenal pasti dua fungsi dalam reka bentuk dan pembangunan produk. Kemudian, cadangkan satu contoh produk dan huraikan proses perancangan bagi produk tersebut.

(40 marks/*markah*)

(c) Design for manufacturing and assembly is an approach to product design that systematically includes considerations of manufacturability and assemblability in the design. Design for Manufacturing (DFM) and design for assembly (DFA), DFM/A also includes principles and guidelines that indicate how to design a given product for maximum manufacturability. Identify the three differences and three similarities between DFA and DFM in manufacturing.

Reka bentuk dalam pembuatan dan pemasangan adalah satu pendekatan untuk merekabentuk produk yang sistematik termasuk pertimbangan keupayaan pembuatan dan kebolehan penggabungan dalam reka bentuk. Design untuk Pembuatan (DFM) dan reka bentuk untuk pemasangan (DFA), DFM / A juga merangkumi prinsip dan garis panduan yang menunjukkan bagaimana untuk merekabentuk produk yang diberikan untuk keupayaan pembuatan yang maksimum. Kenal pasti tiga perbezaan dan tiga persamaan antara DFA dan DFM dalam pembuatan.

(30 marks/*markah*)

Figure 3.1: Foldable bicycle

Rajah 3.1: Basikal lipat.

(d) Figure 3.1 shows a 'foldable bicycle'. Suggest how it might be manufactured based on principle in design manufacturing and assembly.

Rajah 3.1 menunjukkan basikal lipat. Cadangkan bagaimana ia diperbuat berdasarkan prinsip dalam rekabentuk pembuatan dan pemasangan.

(10 marks/*markah*)

4. (a) What is Normal Distribution (Gauss Distribution)?

Apakah Taburan Normal (Taburan Gauss)

(8 marks/*markah*)

(b) Identify four characteristics of Normal Distribution

Kenalpastikan empat ciri-ciri Pengedaran Normal

(8 marks/*markah*)

(c) Describe the importance of central limit theorem?

Terangkan kepentingan teorem had pusat

(4 marks/*markah*)

(d) An Electrical Engineer would like to understand Probing Test failure due to Co-planarity issue when he opens the unit for Failure Analysis. He would like to comprehend the Correlation between Positioning Error and FM Sensitivity. After data collection as in Figure 4.1, he continued to perform Pearson Correlation and gotten results.

Please complete the analysis and draw the conclusion.

Seorang Jurutera Elektrik ingin memahami kegagalan Ujian Probing kerana isu Co-planarity, ketika ia membuka unit untuk Analisis Kegagalan. Kemudian, beliau ingin memahami kedua-dua Korelasi antara Kesilapan Posisi dan Kepekaan FM. Selepas pengumpulan data, beliau terus melakukan Korelasi Pearson dan mendapat keputusan seperti Rajah 4.1

Selesaikan analisis dan membuat kesimpulan .

(80 marks/*markah*)

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Answer Question 4(d) in Appendix A2. Detach Appendix A2 from your question script and attach it with your answer script.

Jawap soalan 4(d) dalam Lampiran A2. Ceraikan lampiran A2 dari buku soalan dan lampirkan bersama-sama buku jawapan anda.

Correlations

	Position Error	FM Sensitivity
Position Error		0.1574 (29) 0.4149
FM Sensitivity	0.1574 (29) 0.4149	

Correlation
(Sample Size)
P-Value

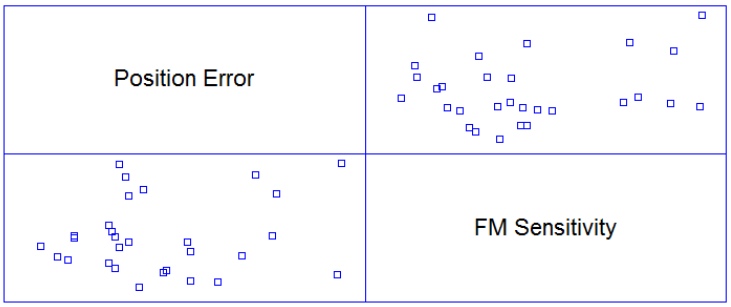

Figure 4.1: Correlation between Positioning Error and FM Sensitivity.

Rajah 4.1: Kolerasi antara Kesilapan Posisi dan Kepekaan FM.

Hypothesis Statement:

Ho : Position Error and FM Sensitivity _____ **(10 marks)**

HA : Position Error and FM Sensitivity _____ **(10 marks)**

Correlation : ___ **(10 marks)**

Sample Size : ____ **(10 marks)**

P value : ___ **(10 marks)**

Hence, Accept __ , **(5 marks)**; Reject __ **(5 marks)**;

Results:

Since the P-value in the ANOVA table is less than 0.05, statistically there __ significant relationship between Position Error and FM Sensitivity**.** **(10 marks)**

Conclusions:

_____ correlation between Position Error and FM Sensitivity . **(10 marks)**

5. A PCB Design and Validation Engineer would like to evaluate LED from OSRAM (O) and Lumileds (X) on the designed Printed Circuit Board for latest iPhone 6G Series as in Figure 5.1. The engineer had sampled 36 pieces of LEDs each and ran experiment with both suppliers' LEDs on the PCB Layout.

Results from the experiment using Minitab Software and fill in the blanks

Seorang Jurutera Rekabentuk dan Pengesahan PCB ingin menilai LED dari OSRAM (O) dan Lumileds (X) pada Papan Litar Bercetak yang direka untuk Siri iPhone 6G yang terkini seperti dalam Rajah 5.1. Jurutera mempunyai sampel sebanyak 36 buah LED dan menjalankan eksperimen dengan kedua-dua pembekal LED pada permukaan PCB.

Hasil daripada eksperimen dengan menggunakan Perisian Minitab dan isikan tempat kosong

(100 marks/*markah*)

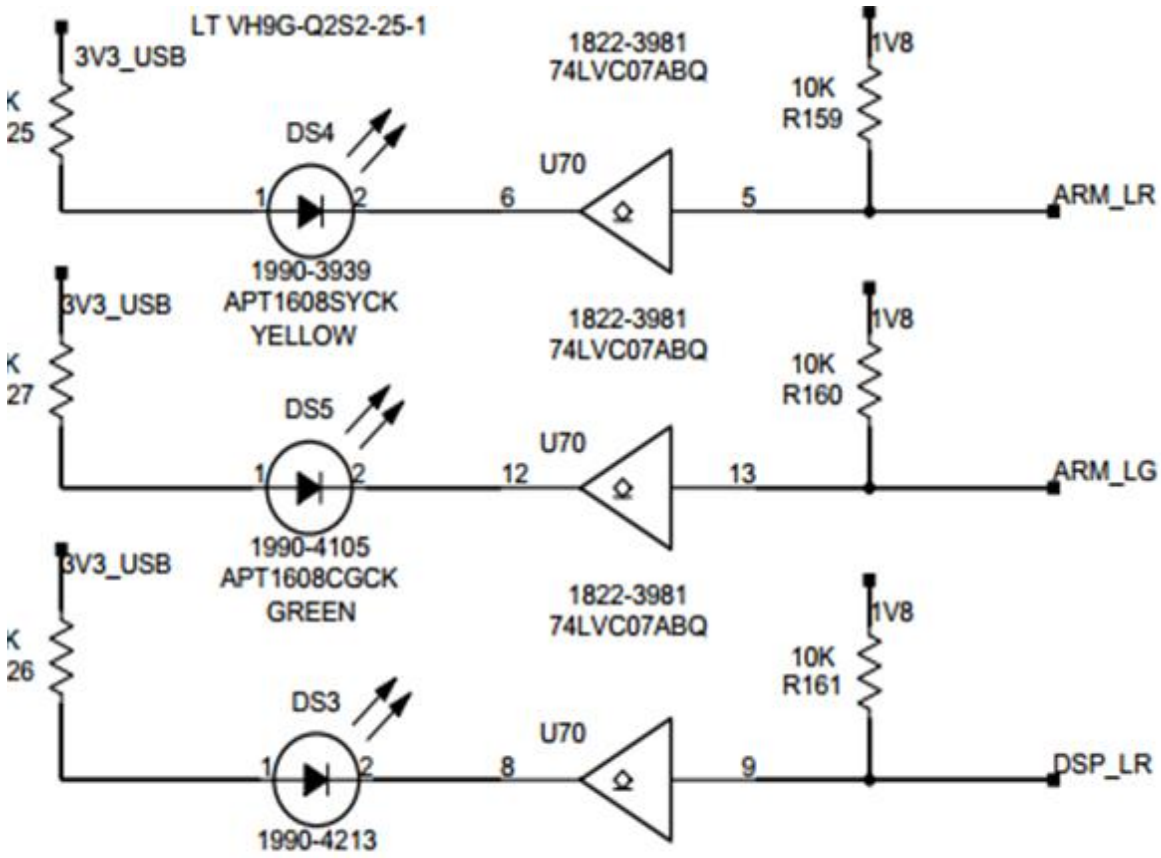

Figure 5.1: Printed Circuit Board designed for latest iPhone 6G Series

Rajah 5.1: Papan Litar Bercetak yang direka untuk iPhone 6G Series terbaru.

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Answer Question 5 in Appendix A3. Detach Appendix A3 from your question script and attach it with your answer script.

Jawap soalan 5 dalam Lampiran A3. Ceraikan lampiran A3 dari buku soalan dan lampirkan bersama-sama buku jawapan anda.

Hypothesis Statement:

H_O : OSRAM (O) and Lumileds (X) LEDs are similar.

H_A : _____**(5 marks)**

Normality Test;

- OSRAM (O) _____ (p =_____), **(10 marks)**

- Lumileds (X) _____(p = _____) **(10 marks)**

Since data _____, **(5 marks)**

Variance Check

Data Not Normal *Or* Normal; -Ho : $\sigma_O = \sigma_X$; H_A: $\sigma_O \neq \sigma_X$

_____ **(5 marks)**Test, p = _____,**(5 marks)** therefore σ between OSRAM (O) and Lumileds (X) LEDs is _____.**(5 marks)**

Test for _____; _____, (5 marks)

-Ho : $_O = _X$; **(5 marks)** H_A : $_O \neq _X$ **(5 marks)**

-P = _____, **(5 marks)** therefore _____ **(5 marks)** is _____**(5 marks)** significantly different for LEDs value.

Results:

Since _____**(5 marks)** Test and _____**(5 marks)** show _____**(5 marks)** difference; thus Accept _____.**(5 marks)**

Conclusions:

_____**(5 marks)**

Tests for Normality for OSRAM
AD 0.492 P-Value 0.205
RJ 0.982 P-Value >0.100
KS 0.132 P-Value 0.114
Computed Chi-Square goodness-of-fit statistic = 10.2222
P-Value = 0.675669
Z score for skewness = 0.92107
P-Value = 0.357012
Z score for kurtosis = -0.636429
P-Value = 0.524494

Tests for Normality for Lumileds
AD 0.412 P-Value 0.324
RJ 0. 983 P-Value >0.100
KS 0.110 -Value >0.150
Computed Chi-Square goodness-of-fit statistic = 21.7778
P-Value = 0.0589021
Z score for skewness = 1.07095
P-Value = 0.284192
Z score for kurtosis = 0.0801172
P-Value = 0.936139

Test for Equal Variances: OSRAM, Lumileds
Method
Null hypothesis All variances are equal
Alternative hypothesis At least one variance is different
Significance level $\alpha = 0.05$
95% Bonferroni Confidence Intervals for Standard Deviations

Sample	N	StDev	CI
OSRAM	36	1.50851	(1.20949, 2.00639)
Lumileds	36	1.48872	(1.15782, 2.04128)

Individual confidence level = 97.5%

Method	Statistic	P-Value
Multiple comparisons	0.01	0.934
Levene	0.03	0.870

Two-Sample T-Test and CI: OSRAM, Lumileds
Two-sample T for OSRAM vs Lumileds

	N	Mean	StDev	SE Mean
OSRAM	36	18.43	1.51	0.25
Lumileds	36	18.41	1.49	0.25

Difference = μ (OSRAM) - μ (Lumileds)
Estimate for difference: 0.017
95% CI for difference: (-0.688, 0.721)
T-Test of difference = 0 (vs ≠): T-Value = 0.05 P-Value = 0.963 DF = 70
Both use Pooled StDev = 1.4986 (assume equal variance)

Two-Sample T-Test and CI: OSRAM, Lumileds
Two-sample T for OSRAM vs Lumileds

	N	Mean	StDev	SE Mean
OSRAM	36	18.43	1.51	0.25
Lumileds	36	18.41	1.49	0.25

Difference = μ (OSRAM) - μ (Lumileds)
Estimate for difference: 0.017
95% CI for difference: (-0.688, 0.721)
T-Test of difference = 0 (vs ≠): T-Value = 0.05
P-Value = 0.963 DF = 69

Mann-Whitney Test and CI: OSRAM, Lumileds

	N	Median
OSRAM	36	18.210
Lumileds	36	18.310

Point estimate for η1 - η2 is -0.000
95.1 Percent CI for η1 - η2 is (-0.650,0.700)
W = 1314.5
Test of η1 = η2 vs η1 ≠ η2 is significant at 1.0000
The test is significant at 1.0000 (adjusted for ties)

Test for Equal Variances: OSRAM, Lumileds
Method
Null hypothesis All variances are equal
Alternative hypothesis At least one variance is different
Significance level $\alpha = 0.05$

F method is used. This method is accurate for normal data only.
95% Bonferroni Confidence Intervals for Standard Deviations

Sample	N	StDev	CI
OSRAM	36	1.50851	(1.18872, 2.04887)
Lumileds	36	1.48872	(1.17312, 2.02198)

Individual confidence level = 97.5%

Method	Statistic	P-Value
F	1.03	0.938

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APPENDIX (A3)

LAMPIRAN (A3)

Hypothesis Statement:

H_O : OSRAM (O) and Lumileds (X) LEDs are similar.

H_A : _____**(5 marks)**

Normality Test;

- OSRAM (O) _____ (p =_____), **(10 marks)**
- Lumileds (X) _____(p = _____) **(10 marks)**

Since data _____, **(5 marks)**

Variance Check

Data Not Normal *Or* Normal; -Ho : $\sigma_O = \sigma_X$; H_A: $\sigma_O \neq \sigma_X$

_____ **(5 marks)**Test, p = _____,**(5 marks)** therefore σ between OSRAM (O) and Lumileds (X) LEDs is _____.**(5 marks)**

Test for _____; _____, (5 marks)

-Ho : $_O = _X$; **(5 marks)** H_A : $_O \neq _X$ **(5 marks)**

-P = _____, **(5 marks)** therefore _____ **(5 marks)** is _____**(5 marks)** significantly different for LEDs value.

Results:

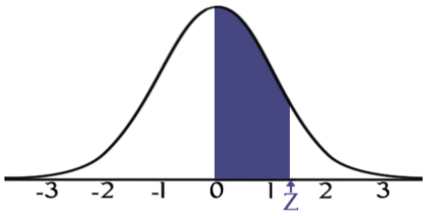
Since _____**(5 marks)** Test and _____**(5 marks)** show _____**(5 marks)** difference; thus Accept _____.**(5 marks)**

Conclusions:

_____**(5 marks)**

APPENDIX (A1)

LAMPIRAN (A1)



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and *z* standard deviations above the mean. For example, for *z* = 1.25 the area under the curve between the mean (0) and *z* is 0.3944.

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

APPENDIX (A2)

LAMPIRAN (A2)

Correlations

	Position Error	FM Sensitivity
Position Error		0.1574 (29) 0.4149
FM Sensitivity	0.1574 (29) 0.4149	

Correlation
(Sample Size)
P-Value

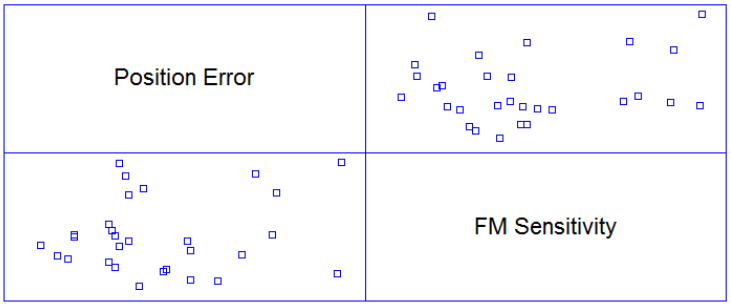


Figure 4.1: Correlation between Positioning Error and FM Sensitivity.

Rajah 4.1: Kolerasi antara Kesilapan Posisi dan Kepekaan FM.

Hypothesis Statement:

Ho : Position Error and FM Sensitivity _____ **(10 marks)**

HA : Position Error and FM Sensitivity _____ **(10 marks)**

Correlation : ___ **(10 marks)**

Sample Size : ____ **(10 marks)**

P value : ___ **(10 marks)**

Hence, Accept __ , **(5 marks)**; Reject __ **(5 marks)**;

Results:

Since the P-value in the ANOVA table is less than 0.05, statistically there __ significant relationship between Position Error and FM Sensitivity**.** **(10 marks)**

Conclusions:

_____ correlation between Position Error and FM Sensitivity . **(10 marks)**