

เอกสารอ้างอิง



ภาษาไทย

ทวี รื่นจินดา, สถิติเศรษฐศาสตร์ กรุงเทพมหานคร : โรงพิมพ์มหาวิทยาลัยรามคำแหง,
2520

ประยูร จินดาประดิษฐ์ การธนาคารพาณิชย์ กรุงเทพมหานคร : โรงพิมพ์อักษรสมัย,
2514

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2520

อำพล ธรรมเจริญ ทฤษฎีความน่าจะเป็นและสถิติ กรุงเทพมหานคร : โรงพิมพ์รุ่ง-
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ภาพผนวก 1

- นิยาม 1 สำหรับเลขจำนวนเต็ม a และ b ใด ๆ ที่ $b \neq 0$ จะมีเลขจำนวนเต็ม t และ n คู่เดียวที่ทำให้ $a = bt + n$, $0 \leq n < |b|$ t คือ ผลหาร และ n คือ เศษจากการหาร
- นิยาม 2 เลขจำนวนเต็ม a หารด้วยเลขจำนวนเต็ม b ใดลงตัวแล้ว จะมีเลขจำนวนเต็ม t ที่จะทำให้ $a = bt$
- นิยาม 3 เลขจำนวนเต็ม p จะเป็น prime number เมื่อ p ไม่ใช่ 0 และ ± 1 และ p จะหารด้วย ± 1 และ $\pm p$ ลงตัวเท่านั้น
- นิยาม 4 เลขจำนวนเต็ม q จะเป็น ห.ร.ม. ของเลขจำนวนเต็ม a และ b เมื่อ q เป็น จำนวนเต็มที่ใหญ่ที่สุดที่หาร a และ b ใดลงตัว สัญลักษณ์ $(a,b) = q$
- นิยาม 5 เลขจำนวนเต็ม d จะเป็น ค.ร.ม. ของเลขจำนวนเต็ม a และ b เมื่อ d เป็นจำนวนเต็มที่น้อยที่สุดที่ทั้ง a และ b หาร d ใดลงตัว สัญลักษณ์ $[a,b] = d$
- นิยาม 6 เลขจำนวนเต็ม a และ b จะเป็น relatively prime ต่อกันเมื่อ $(a,b) = 1$
- นิยาม 7 เลขจำนวนเต็ม a และ b จะเป็น congruent modulo m ถ้าผลต่างของ a และ b เป็นผลคูณจำนวนเต็มของ m นั่นคือ
- 1) $(a-b)$ หารด้วย m ลงตัว
 - 2) a และ b เมื่อหารด้วย $|m|$ จะมีเศษเท่ากัน สัญลักษณ์ $a \equiv b \pmod{m}$
- นิยาม 8 สำหรับค่า a ที่กำหนดให้ เลขจำนวนเต็มบวกที่น้อยที่สุดที่ $a \equiv n \pmod{m}$ แล้ว n จะเป็น residue modulo m
- นิยาม 9 เลขจำนวนเต็มบวกที่น้อยกว่า m และเป็น relatively prime กับ m จะเรียกว่า Euler's phi-function และแทนด้วยสัญลักษณ์ $\phi(m)$ เช่น $m=31, \phi(m)=30$

นิยาม 10 Power residues คือ residues ของการยกกำลังของ $a \pmod{m}$ reduce ที่จากการยกกำลังที่ i ของ $a \pmod{m}$ จะเขียนแทนด้วย n_i และมี congruence relation $n_i \equiv a^i \pmod{m}$ ($i = 1, 2, 3, \dots$)

นิยาม 11 ถ้า $(a, m) = 1$ ถ้า $h = i$ ซึ่งเป็นกำลังที่บวกที่น้อยที่สุด แล้ว $a^h \equiv 1 \pmod{m}$ h จะเรียกว่า อันดับ (order) ของ $a \pmod{m}$ และ h จะเรียกว่า indicator ของ m ถ้า a อยู่ใน m ในกรณีนี้ใช้สัญลักษณ์ว่า $h = \lambda(m)$ อันดับ h ของ $a \pmod{m}$ จะเท่ากับจำนวนตัวเลขที่ไม่ซ้ำกัน นั่นคือ เป็นความยาวของลำดับของ power residue ที่ไม่ซ้ำกัน และเรียกว่า คาบ (period) ของ $\{n_i\}$, $i = 1, 2, \dots, h \pmod{m}$

ตัวอย่าง 1 ถ้า $a=5$, $m=31$, $\phi(m) = 30$

Power residues จะมีดังนี้

$$i \quad a^i \quad n_i \equiv a^i \pmod{31}$$

$$1 \quad 5 \quad 5$$

$$2 \quad 25 \quad 25$$

$$3 \quad 125 \quad 1$$

$$4 \quad 625 \quad 5 \quad \text{ในที่นี้จะมีคาบ } h = 3$$

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ตัวอย่าง 2 ถ้า $a = 3$, $m = 31$, $\phi(m) = 30$

| i | a^i | n_i | i | n_i | i | n_i |
|-----|-------|-------|-----|-------|-----|-------|
| 1 | 3 | 3 | 11 | 13 | 21 | 15 |
| 2 | 9 | 9 | 12 | 8 | 22 | 15 |
| 2 | 27 | 27 | 13 | 24 | 23 | 11 |
| 4 | 81 | 19 | 14 | 10 | 24 | 2 |
| 5 | 243 | 26 | 15 | 30 | 25 | 6 |
| 6 | 729 | 16 | 16 | 28 | 26 | 18 |
| 7 | 2187 | 17 | 17 | 22 | 27 | 23 |
| 8 | 6561 | 20 | 18 | 4 | 28 | 7 |
| 9 | 19683 | 29 | 19 | 12 | 29 | 21 |
| 10 | 59049 | 25 | 20 | 5 | 30 | 1 |

ในที่นี้ คาบ $h = 30$

นิยาม 12 เลขจำนวนเต็ม a ที่สอดคล้องกับ $h = \phi(m) = (\text{mod } m)$ จะเรียกว่า primitive root ของ m

จากตัวอย่าง 1 ในนิยาม 11

$$h = 3 \neq \phi(31) \quad \text{เมื่อ } a = 5$$

∴ 5 ไม่เป็น primitive root ของ 31

แต่จากตัวอย่าง 2 ในนิยาม 11

$$h = 30 = \phi(31) \quad \text{เมื่อ } a = 3$$

∴ 3 จะเป็น primitive root ของ 31

ทฤษฎี 1 ถ้า $a \equiv b \pmod{m}$ และ $x \equiv y \pmod{m}$ ดังนั้น
 $a \pm x \equiv b \pm y \pmod{m}$ และ $ax \equiv by \pmod{m}$

ทฤษฎี 2 ถ้า $(d, m) = g$ แล้ว $dx \equiv dy \pmod{m}$ จะเป็นผลให้ $x \equiv y \pmod{m/g}$

ทฤษฎี 3 ถ้า $a \equiv b \pmod{m}$ และ d เป็นตัวหารตัวหนึ่งของ m ดังนั้น
 $a \equiv b \pmod{d}$

ทฤษฎี 4 ให้ m เป็นเลขจำนวนเต็มที่ไม่ใช่ 0 และ ± 1 m จะแยกเป็นตัวประกอบ
 (ผลคูณ) ของ prime number นั่นคือ
 $m = \prod p_i^{e_i} \quad (i = 1, 2, 3, \dots)$ e_i เป็นค่าคงที่

ทฤษฎี 5 ถ้า $(a, m) = 1$ ดังนั้น $a^{\phi(m)} \equiv 1 \pmod{m}$ เป็นผลให้
 (1) อันดับที่ใหญ่ที่สุดที่เป็นไปได้ของ a คือ $h = \phi(m)$
 (2) ถ้า $n < m$ และ $(n, m) = 1$ ดังนั้น $na^h \equiv n \pmod{m}$
 โดยที่ $h = \phi(m)$

ทฤษฎี 6 ถ้า $m = p^e$ และ p เป็น odd prime ดังนั้น

$$h = \lambda(m) = (p-1)p^{e-1} = \phi(m)$$

สำหรับค่า a ที่เป็น primitive root ของ m

บทแทรก ถ้า $p = 2$, $h = \lambda(m) = 2^{e-2}$ สำหรับ $e > 2$ ดังนั้น
 $\lambda(m) \neq \phi(m)$

ทฤษฎี 7 ถ้า $m = \prod p_i^{e_i} \quad i = 1, 2, 3, \dots, s$ ดังนั้น

$$(1) \lambda(m) = \text{ค.ร.น.} [\lambda(p_1^{e_1}), \lambda(p_2^{e_2}), \dots, \lambda(p_s^{e_s})]$$

(2) จะมีค่า a ที่มีอันดับเท่ากับแต่ละ $\lambda(p_i^{e_i})$

บทแทรก ถ้า $p_1 = 2$ ดังนั้น

$$\lambda(m) = \text{ค.ร.น.} [\lambda(2^{e_1}), \phi(p_2^{e_2}), \phi(p_3^{e_3}), \dots]$$

ภาคผนวก 2

สมุดบัญชี

00000000111111111222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

2000 0200 5 11111 05 BANK OF BANGKOK
0050 TELLER(IN)
0050 SIGNATURE
0100 LEDGER
0050 CHECKER
0100 TELLER(OUT)

ตัวอย่างสมุดบัญชี 1

2000 0300 6 11111 05 BANK OF BANGKOK
0050 TELLER(IN)
0030 SIGNATURE
0100 LEDGER
0025 CHECKER
0030 AUTHORIZER
0075 TELLER(OUT)

ตัวอย่างสมุดบัญชี 2

2000 0316 6 66 101111 5 SAMYAEK BRANCH
0111 TELLER(IN)
0025 SIGNATURE
0107 LEDGER
0050 CHECKER
0064 AUTHORIZER
0083 TELLER(OUT)

ตัวอย่างสมุดบัญชี 3

๑
กรมท

0000000011111111112222222222333333333344444444445555555555666666666677777777778
12345678901234567890123456789012345678901234567890123456789012345678901234567890

0040 0300 7 60 1011111 01 SAMPLE BRANCH 1
0200 TELLER(IN)
0100 SIGNATURE
0200 LEDGER
0150 CHECKER
0100 AUTHORIZER
0100 PAY-OUT
0200 TELLER(OUT)

ตัวอย่างของรูปที่ 4

0020 0300 8 50 11011111 1 SAMPLE BRANCH 1
0200 TELLER(IN)
0100 PAY-OUT
0100 SIGNATURE
0200 LEDGER
0150 CHECKER
0100 AUTHORIZER
0100 PAY-OUT
0200 TELLER(OUT)

ตัวอย่างของรูปที่ 5

ภาคผนวก 3

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : BANK OF BANGKOK

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 2.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.50 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 25.58 | |
| UTILIZATION OF STATION 2 (%) | 24.49 | |
| UTILIZATION OF STATION 3 (%) | 48.17 | |
| UTILIZATION OF STATION 4 (%) | 25.33 | |
| UTILIZATION OF STATION 5 (%) | 50.62 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.18 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.16 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.92 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.17 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.96 | |
| AVERAGE WAITING TIME IN SYSTEM | 2.39 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.87 | |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : BANK OF BANGKOK

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 2.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.50 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 24.86 | |
| UTILIZATION OF STATION 2 (%) | 24.34 | |
| UTILIZATION OF STATION 3 (%) | 51.14 | |
| UTILIZATION OF STATION 4 (%) | 23.78 | |
| UTILIZATION OF STATION 5 (%) | 49.49 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.17 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.16 | |
| AVERAGE WAITING TIME AT STATION 3 | 1.10 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.12 | |
| AVERAGE WAITING TIME AT STATION 5 | 1.02 | |
| AVERAGE WAITING TIME IN SYSTEM | 2.58 | |
| AVERAGE TIME SPENT IN SYSTEM | 6.05 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 2.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.50 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 25.34 | |
| UTILIZATION OF STATION 2 (%) | 25.65 | |
| UTILIZATION OF STATION 3 (%) | 50.05 | |
| UTILIZATION OF STATION 4 (%) | 25.44 | |
| UTILIZATION OF STATION 5 (%) | 50.51 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.17 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.91 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.18 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.99 | |
| AVERAGE WAITING TIME IN SYSTEM | 2.40 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.90 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 2.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.50 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 26.13 | |
| UTILIZATION OF STATION 2 (%) | 26.73 | |
| UTILIZATION OF STATION 3 (%) | 51.23 | |
| UTILIZATION OF STATION 4 (%) | 25.17 | |
| UTILIZATION OF STATION 5 (%) | 50.04 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.20 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.17 | |
| AVERAGE WAITING TIME AT STATION 3 | 1.20 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.18 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.96 | |
| AVERAGE WAITING TIME IN SYSTEM | 2.72 | |
| AVERAGE TIME SPENT IN SYSTEM | 6.17 | |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE * BANK OF BANGKOK

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SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 2.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.50 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEUGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 25.13 | |
| UTILIZATION OF STATION 2 (%) | 25.13 | |
| UTILIZATION OF STATION 3 (%) | 49.61 | |
| UTILIZATION OF STATION 4 (%) | 24.95 | |
| UTILIZATION OF STATION 5 (%) | 49.95 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 3 | 1.03 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 5 | 1.00 | |
| AVERAGE WAITING TIME IN SYSTEM | 2.48 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.98 | |

SIMULATION COMPLETED ***

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.30 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.25 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.30 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.75 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 17.07 | |
| UTILIZATION OF STATION 2 (%) | 10.25 | |
| UTILIZATION OF STATION 3 (%) | 33.14 | |
| UTILIZATION OF STATION 4 (%) | 8.62 | |
| UTILIZATION OF STATION 5 (%) | 10.11 | |
| UTILIZATION OF STATION 6 (%) | 24.76 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.05 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.02 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.23 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.25 | |
| AVERAGE WAITING TIME IN SYSTEM | 0.90 | |
| AVERAGE TIME SPENT IN SYSTEM | 3.97 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.30 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.25 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.30 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.75 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 16.73 | |
| UTILIZATION OF STATION 2 (%) | 10.00 | |
| UTILIZATION OF STATION 3 (%) | 32.50 | |
| UTILIZATION OF STATION 4 (%) | 8.00 | |
| UTILIZATION OF STATION 5 (%) | 9.19 | |
| UTILIZATION OF STATION 6 (%) | 25.28 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.11 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.04 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.45 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.02 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.25 | |
| AVERAGE WAITING TIME IN SYSTEM | 0.89 | |
| AVERAGE TIME SPENT IN SYSTEM | 3.96 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.30 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.25 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.30 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.75 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 16.77 | |
| UTILIZATION OF STATION 2 (%) | 9.75 | |
| UTILIZATION OF STATION 3 (%) | 33.47 | |
| UTILIZATION OF STATION 4 (%) | 8.34 | |
| UTILIZATION OF STATION 5 (%) | 9.88 | |
| UTILIZATION OF STATION 6 (%) | 25.49 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.09 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.46 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.02 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.19 | |
| AVERAGE WAITING TIME IN SYSTEM | 0.82 | |
| AVERAGE TIME SPENT IN SYSTEM | 3.91 | |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : BANK OF BANGKOK

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SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.30 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.25 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.30 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.75 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 15.97 | |
| UTILIZATION OF STATION 2 (%) | 9.57 | |
| UTILIZATION OF STATION 3 (%) | 32.10 | |
| UTILIZATION OF STATION 4 (%) | 7.92 | |
| UTILIZATION OF STATION 5 (%) | 9.50 | |
| UTILIZATION OF STATION 6 (%) | 24.18 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.09 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.06 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.43 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.02 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.20 | |
| AVERAGE WAITING TIME IN SYSTEM | 0.82 | |
| AVERAGE TIME SPENT IN SYSTEM | 3.84 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 0.50 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.30 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.25 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.30 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.75 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 16.65 | |
| UTILIZATION OF STATION 2 (%) | 10.97 | |
| UTILIZATION OF STATION 3 (%) | 34.04 | |
| UTILIZATION OF STATION 4 (%) | 8.11 | |
| UTILIZATION OF STATION 5 (%) | 10.04 | |
| UTILIZATION OF STATION 6 (%) | 26.80 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.09 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.05 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.46 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.02 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.27 | |
| AVERAGE WAITING TIME IN SYSTEM | 0.93 | |
| AVERAGE TIME SPENT IN SYSTEM | 4.08 | |

SIMULATION COMPLETED ***

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.16 | |
| MEAN OF SERVICE TIME OF STATION 1 | 1.11 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.25 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.07 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.64 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.83 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 35.33 | |
| UTILIZATION OF STATION 2 (%) | 2.56 | |
| UTILIZATION OF STATION 3 (%) | 32.74 | |
| UTILIZATION OF STATION 4 (%) | 15.99 | |
| UTILIZATION OF STATION 5 (%) | 19.74 | |
| UTILIZATION OF STATION 6 (%) | 25.70 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.31 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.00 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.24 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.04 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.07 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.12 | |
| AVERAGE WAITING TIME IN SYSTEM | 1.57 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.75 | |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SANYAER BRANCH

PAGE 2

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.16 | |
| MEAN OF SERVICE TIME OF STATION 1 | 1.11 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.25 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.07 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.54 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.63 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 35.12 | |
| UTILIZATION OF STATION 2 (%) | 2.81 | |
| UTILIZATION OF STATION 3 (%) | 34.10 | |
| UTILIZATION OF STATION 4 (%) | 16.24 | |
| UTILIZATION OF STATION 5 (%) | 20.92 | |
| UTILIZATION OF STATION 6 (%) | 27.18 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.59 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.53 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.09 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.18 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.33 | |
| AVERAGE WAITING TIME IN SYSTEM | 1.72 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.93 | |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE - SAMYAK BRANCH

PAGE 3

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.16 | |
| MEAN OF SERVICE TIME OF STATION 1 | 1.11 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.25 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.07 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.64 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.83 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 35.18 | |
| UTILIZATION OF STATION 2 (%) | 2.63 | |
| UTILIZATION OF STATION 3 (%) | 32.52 | |
| UTILIZATION OF STATION 4 (%) | 16.18 | |
| UTILIZATION OF STATION 5 (%) | 19.84 | |
| UTILIZATION OF STATION 6 (%) | 26.49 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.74 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.67 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.08 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.17 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.29 | |
| AVERAGE WAITING TIME IN SYSTEM | 1.76 | |
| AVERAGE TIME SPENT IN SYSTEM | 6.01 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.16 | |
| MEAN OF SERVICE TIME OF STATION 1 | 1.11 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.25 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.07 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.64 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.83 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 34.03 | |
| UTILIZATION OF STATION 2 (%) | 2.52 | |
| UTILIZATION OF STATION 3 (%) | 33.68 | |
| UTILIZATION OF STATION 4 (%) | 15.52 | |
| UTILIZATION OF STATION 5 (%) | 19.72 | |
| UTILIZATION OF STATION 6 (%) | 25.75 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.58 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.59 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.09 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.33 | |
| AVERAGE WAITING TIME IN SYSTEM | 1.74 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.92 | |

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 2000 | |
| MEAN OF INTERARRIVAL TIME | 3.16 | |
| MEAN OF SERVICE TIME OF STATION 1 | 1.11 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 0.25 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 1.07 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 0.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 0.64 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 0.83 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 35.12 | |
| UTILIZATION OF STATION 2 (%) | 2.57 | |
| UTILIZATION OF STATION 3 (%) | 33.74 | |
| UTILIZATION OF STATION 4 (%) | 15.55 | |
| UTILIZATION OF STATION 5 (%) | 19.62 | |
| UTILIZATION OF STATION 6 (%) | 26.42 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.63 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.53 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.10 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.15 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.28 | |
| AVERAGE WAITING TIME IN SYSTEM | 1.68 | |
| AVERAGE TIME SPENT IN SYSTEM | 5.96 | |

SIMULATION COMPLETED ***

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE - SAMPLE BRANCH

PAGE 1

SERVICE TIME REPORT (ZERO SERVICE TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 SIGNATURE | STATION 3 LEGGER | STATION 4 CHECKER | STATION 5 AUTHORIZER | STATION 6 PAY-OUT | STATION 7 TELLER(OUT) |
|-------------|-------------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 | 0.06 | 0.42 | 1.76 | 2.85 | 5.09 | 3.33 | 3.86 |
| 2 | 2.63 | 0.0 | 0.14 | 1.11 | 1.98 | 0.05 | 0.15 |
| 3 | 1.78 | 0.10 | 5.66 | 0.58 | 0.73 | 0.69 | 7.19 |
| 4 | 6.26 | 0.0 | 2.19 | 0.13 | 0.84 | 0.56 | 3.88 |
| 5 | 8.80 | 0.0 | 0.86 | 0.42 | 0.03 | 1.53 | 3.43 |
| 6 | 2.01 | 1.14 | 4.32 | 2.10 | 2.18 | 3.25 | 3.14 |
| 7 | 2.41 | 0.0 | 0.68 | 2.91 | 0.18 | 1.23 | 0.22 |
| 8 | 0.43 | 0.0 | 7.56 | 0.42 | 0.28 | 0.83 | 1.86 |
| 9 | 0.23 | 0.75 | 3.60 | 0.69 | 0.02 | 0.41 | 2.80 |
| 10 | 0.65 | 0.0 | 0.07 | 0.57 | 1.79 | 0.33 | 1.40 |
| 11 | 0.05 | 0.0 | 2.36 | 0.80 | 0.48 | 0.32 | 0.20 |
| 12 | 0.20 | 0.0 | 0.49 | 1.12 | 2.01 | 1.84 | 0.08 |
| 13 | 1.45 | 0.0 | 1.94 | 1.59 | 0.55 | 0.91 | 1.76 |
| 14 | 1.70 | 0.0 | 0.83 | 0.66 | 0.02 | 0.61 | 0.80 |
| 15 | 0.91 | 0.0 | 3.82 | 0.76 | 0.20 | 2.77 | 0.33 |
| 16 | 7.83 | 0.0 | 0.46 | 0.62 | 0.40 | 0.90 | 4.51 |
| 17 | 3.67 | 0.96 | 0.09 | 2.17 | 0.09 | 0.85 | 0.81 |
| 18 | 3.98 | 0.0 | 7.36 | 1.88 | 2.29 | 0.37 | 2.98 |
| 19 | 0.83 | 0.0 | 4.19 | 0.53 | 0.39 | 1.14 | 2.53 |
| 20 | 2.16 | 1.32 | 2.18 | 1.47 | 0.68 | 0.28 | 1.67 |
| 21 | 1.04 | 0.39 | 13.90 | 2.88 | 0.57 | 1.34 | 5.69 |
| 22 | 5.36 | 0.49 | 1.40 | 2.29 | 0.39 | 0.36 | 1.42 |

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SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

PAGE 2

SERVICE TIME REPORT (ZERO SERVICE TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1--- TELLER(IN) | STATION 2--- SIGNATURE | STATION 3--- LEDGER | STATION 4--- CHECKER | STATION 5--- AUTHORIZER | STATION 6--- PAY-OUT | STATION 7--- TELLER(OUT) |
|----------------|----------------------------|---------------------------|------------------------|-------------------------|----------------------------|-------------------------|-----------------------------|
| 23 | 1.17 | 0.18 | 0.14 | 3.73 | 0.16 | 0.64 | 0.53 |
| 24 | 3.19 | 0.0 | 5.21 | 2.12 | 0.97 | 2.17 | 1.98 |
| 25 | 2.33 | 0.0 | 1.17 | 0.47 | 2.55 | 1.89 | 1.50 |
| 26 | 3.73 | 0.03 | 0.10 | 1.09 | 0.31 | 2.12 | 1.52 |
| 27 | 0.33 | 3.07 | 6.31 | 7.32 | 0.37 | 0.25 | 3.15 |
| 28 | 0.77 | 0.0 | 0.08 | 0.14 | 0.58 | 1.40 | 0.08 |
| 29 | 0.58 | 0.0 | 3.23 | 0.96 | 0.97 | 1.40 | 0.61 |
| 30 | 1.60 | 3.53 | 3.14 | 1.44 | 3.04 | 0.24 | 2.60 |
| 31 | 2.09 | 0.0 | 1.24 | 3.58 | 1.07 | 0.09 | 2.87 |
| 32 | 1.23 | 0.49 | 2.38 | 0.59 | 0.59 | 1.10 | 2.44 |
| 33 | 0.05 | 0.30 | 1.56 | 0.04 | 0.94 | 1.15 | 5.04 |
| 34 | 1.15 | 0.0 | 1.03 | 0.17 | 0.42 | 0.52 | 0.53 |
| 35 | 1.57 | 0.0 | 1.38 | 0.22 | 1.32 | 2.61 | 0.75 |
| 36 | 0.72 | 0.0 | 5.38 | 6.38 | 0.26 | 0.36 | 2.82 |
| 37 | 0.53 | 0.0 | 1.78 | 0.40 | 0.72 | 0.30 | 0.18 |
| 38 | 0.12 | 0.0 | 0.12 | 0.51 | 0.48 | 0.49 | 0.30 |
| 39 | 2.13 | 0.0 | 11.03 | 1.67 | 0.55 | 0.17 | 2.30 |
| 40 | 5.46 | 0.37 | 3.89 | 0.61 | 0.90 | 0.83 | 0.43 |

ENTER/EXIT TIME REPORT (ZERO TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 SIGNATURE | STATION 3 LEDGER | STATION 4 CHECKER | STATION 5 AUTHORIZER | STATION 6 PAY-OUT | STATION 7 TELLER(OUT) |
|-------------|-------------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 ENTER | 0.0 | 0.06 | 0.48 | 2.24 | 5.09 | 10.19 | 13.52 |
| EXIT | 0.06 | 0.48 | 2.24 | 5.09 | 10.19 | 13.52 | 17.38 |
| 2 ENTER | 1.20 | 0.0 | 3.83 | 3.97 | 6.21 | 12.16 | 13.57 |
| EXIT | 3.83 | 0.0 | 3.97 | 6.21 | 12.16 | 13.57 | 17.53 |
| 3 ENTER | 1.75 | 5.61 | 5.71 | 11.37 | 11.95 | 12.69 | 14.26 |
| EXIT | 5.61 | 5.71 | 11.37 | 11.95 | 12.69 | 14.26 | 24.72 |
| 4 ENTER | 2.29 | 0.0 | 11.87 | 14.06 | 14.19 | 15.03 | 15.59 |
| EXIT | 11.87 | 0.0 | 14.06 | 14.19 | 15.03 | 15.59 | 28.53 |
| 5 ENTER | 2.42 | 0.0 | 20.47 | 21.53 | 21.95 | 21.97 | 23.51 |
| EXIT | 20.47 | 0.0 | 21.53 | 21.95 | 21.97 | 23.51 | 32.01 |
| 6 ENTER | 2.76 | 22.68 | 23.82 | 28.14 | 30.24 | 32.42 | 36.27 |
| EXIT | 22.68 | 23.82 | 28.14 | 30.24 | 32.42 | 36.27 | 39.41 |
| 7 ENTER | 4.06 | 0.0 | 25.09 | 28.82 | 33.14 | 33.33 | 37.50 |
| EXIT | 25.09 | 0.0 | 28.82 | 33.14 | 33.33 | 37.50 | 39.64 |
| 8 ENTER | 11.77 | 0.0 | 25.52 | 36.38 | 36.80 | 37.08 | 38.33 |
| EXIT | 25.52 | 0.0 | 36.38 | 36.80 | 37.08 | 38.33 | 41.50 |
| 9 ENTER | 12.10 | 25.74 | 26.49 | 39.99 | 40.68 | 40.70 | 41.11 |
| EXIT | 25.74 | 26.49 | 39.99 | 40.68 | 40.70 | 41.11 | 46.30 |
| 10 ENTER | 17.13 | 0.0 | 26.40 | 40.06 | 41.25 | 43.04 | 43.37 |
| EXIT | 26.40 | 0.0 | 40.06 | 41.25 | 43.04 | 43.37 | 45.70 |
| 11 ENTER | 17.16 | 0.0 | 26.45 | 42.42 | 43.22 | 43.70 | 44.02 |
| EXIT | 26.45 | 0.0 | 42.42 | 43.22 | 43.70 | 44.02 | 45.90 |
| 12 ENTER | 20.92 | 0.0 | 26.65 | 42.91 | 44.34 | 46.35 | 46.35 |
| EXIT | 26.65 | 0.0 | 42.91 | 44.34 | 46.35 | 48.19 | 48.27 |
| 13 ENTER | 22.08 | 0.0 | 28.11 | 44.85 | 46.44 | 46.99 | 49.10 |
| EXIT | 28.11 | 0.0 | 44.85 | 46.44 | 46.99 | 49.10 | 50.86 |
| 14 ENTER | 24.56 | 0.0 | 29.80 | 45.68 | 47.11 | 47.13 | 49.71 |
| EXIT | 29.80 | 0.0 | 45.68 | 47.11 | 47.13 | 49.71 | 51.66 |
| 15 ENTER | 25.80 | 0.0 | 30.72 | 49.50 | 50.26 | 50.46 | 53.24 |
| EXIT | 30.72 | 0.0 | 49.50 | 50.26 | 50.46 | 53.24 | 53.57 |

ENTER/EXIT TIME REPORT (ZERO TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 SIGNATURE | STATION 3 LEDGER | STATION 4 CHECKER | STATION 5 AUTHORIZER | STATION 6 PAY-OUT | STATION 7 TELLER(OUT) |
|-------------|-------------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 16 ENTER | 28.03 | 0.0 | 38.54 | 49.96 | 50.88 | 51.28 | 54.14 |
| EXIT | 38.54 | 0.0 | 49.96 | 50.88 | 51.28 | 54.14 | 56.65 |
| 17 ENTER | 28.05 | 42.22 | 43.18 | 50.05 | 53.05 | 53.14 | 54.99 |
| EXIT | 42.22 | 43.18 | 50.05 | 53.05 | 53.14 | 54.99 | 59.46 |
| 18 ENTER | 32.52 | 0.0 | 46.20 | 57.42 | 59.30 | 61.59 | 61.96 |
| EXIT | 46.20 | 0.0 | 57.42 | 59.30 | 61.59 | 61.96 | 64.94 |
| 19 ENTER | 37.10 | 0.0 | 47.03 | 61.61 | 62.13 | 62.52 | 63.69 |
| EXIT | 47.03 | 0.0 | 61.61 | 62.13 | 62.52 | 63.69 | 67.47 |
| 20 ENTER | 38.56 | 49.19 | 50.51 | 63.78 | 65.26 | 65.93 | 66.22 |
| EXIT | 49.19 | 50.51 | 63.78 | 65.26 | 65.93 | 66.22 | 69.14 |
| 21 ENTER | 42.21 | 50.23 | 50.90 | 77.68 | 80.56 | 81.14 | 82.47 |
| EXIT | 50.23 | 50.90 | 77.68 | 80.56 | 81.14 | 82.47 | 88.16 |
| 22 ENTER | 43.23 | 55.59 | 56.08 | 79.08 | 82.86 | 83.24 | 83.60 |
| EXIT | 55.59 | 56.08 | 79.08 | 82.86 | 83.24 | 83.60 | 89.58 |
| 23 ENTER | 47.25 | 56.76 | 56.94 | 79.22 | 86.59 | 86.75 | 87.39 |
| EXIT | 56.76 | 56.94 | 79.22 | 86.59 | 86.75 | 87.39 | 90.11 |
| 24 ENTER | 47.77 | 0.0 | 59.95 | 84.43 | 88.71 | 89.68 | 91.64 |
| EXIT | 59.95 | 0.0 | 84.43 | 86.71 | 89.68 | 91.64 | 93.83 |
| 25 ENTER | 54.05 | 0.0 | 62.27 | 85.60 | 89.17 | 92.22 | 94.07 |
| EXIT | 62.27 | 0.0 | 85.60 | 89.17 | 92.22 | 94.07 | 95.58 |
| 26 ENTER | 56.10 | 66.01 | 66.04 | 85.70 | 90.27 | 92.53 | 94.20 |
| EXIT | 66.01 | 66.04 | 85.70 | 90.27 | 92.53 | 96.20 | 97.72 |
| 27 ENTER | 58.28 | 66.34 | 69.41 | 92.01 | 99.33 | 99.71 | 99.96 |
| EXIT | 66.34 | 69.41 | 92.01 | 99.33 | 99.71 | 99.96 | 103.11 |
| 28 ENTER | 58.41 | 0.0 | 67.19 | 92.09 | 99.47 | 100.29 | 101.69 |
| EXIT | 67.19 | 0.0 | 92.09 | 99.47 | 100.29 | 101.69 | 103.19 |
| 29 ENTER | 60.46 | 0.0 | 67.68 | 95.33 | 100.44 | 101.41 | 103.09 |
| EXIT | 67.68 | 0.0 | 95.33 | 100.44 | 101.41 | 103.09 | 103.60 |
| 30 ENTER | 62.57 | 69.28 | 72.94 | 98.46 | 101.87 | 104.91 | 105.15 |
| EXIT | 69.28 | 72.94 | 98.46 | 101.87 | 104.91 | 105.15 | 107.76 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE * SAMPLE BRANCH

PAGE 2

ENTER/EXIT TIME REPORT (ZERO TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 SIGNATURE | STATION 3 LEDGER | STATION 4 CHECKER | STATION 5 AUTHORIZER | STATION 6 PAY-OUT | STATION 7 TELLER(OUT) |
|-------------|-------------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 31 ENTER | 69.11 | 0.0 | 71.37 | 99.71 | 103.45 | 107.12 | 107.21 |
| 31 EXIT | 71.37 | 0.0 | 99.71 | 105.45 | 107.12 | 107.21 | 110.63 |
| 32 ENTER | 73.45 | 74.68 | 75.17 | 102.09 | 106.04 | 107.72 | 108.82 |
| 32 EXIT | 74.68 | 75.17 | 102.09 | 106.04 | 107.72 | 108.82 | 113.07 |
| 33 ENTER | 73.94 | 74.73 | 75.46 | 103.66 | 106.09 | 108.66 | 109.97 |
| 33 EXIT | 74.73 | 75.46 | 103.66 | 106.09 | 108.66 | 109.97 | 118.11 |
| 34 ENTER | 75.52 | 0.0 | 76.67 | 104.69 | 106.26 | 109.08 | 110.49 |
| 34 EXIT | 76.67 | 0.0 | 104.69 | 106.26 | 109.08 | 110.49 | 116.64 |
| 35 ENTER | 78.25 | 0.0 | 79.82 | 105.99 | 106.48 | 110.40 | 113.10 |
| 35 EXIT | 79.82 | 0.0 | 105.99 | 106.48 | 110.40 | 113.10 | 119.38 |
| 36 ENTER | 84.99 | 0.0 | 85.71 | 111.37 | 117.75 | 118.01 | 118.37 |
| 36 EXIT | 85.71 | 0.0 | 111.37 | 117.75 | 118.01 | 118.37 | 122.29 |
| 37 ENTER | 86.22 | 0.0 | 86.75 | 113.15 | 118.15 | 118.87 | 119.18 |
| 37 EXIT | 86.75 | 0.0 | 113.15 | 118.15 | 118.87 | 119.18 | 122.38 |
| 38 ENTER | 91.65 | 0.0 | 91.77 | 113.27 | 118.67 | 119.35 | 119.84 |
| 38 EXIT | 91.77 | 0.0 | 113.27 | 118.67 | 119.35 | 119.84 | 122.68 |
| 39 ENTER | 93.27 | 0.0 | 95.40 | 124.31 | 125.98 | 126.53 | 126.70 |
| 39 EXIT | 95.40 | 0.0 | 124.31 | 125.98 | 126.53 | 126.70 | 129.00 |
| 40 ENTER | 102.71 | 108.17 | 108.54 | 128.20 | 128.81 | 129.71 | 130.54 |
| 40 EXIT | 108.17 | 108.54 | 128.20 | 128.81 | 129.71 | 130.54 | 130.97 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

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WAITING/IDLE TIME REPORT (POSITIVE MEANS WAITING/NEGATIVE MEANS IDLE)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 SIGNATURE | STATION 3 LEDGER | STATION 4 CHECKER | STATION 5 AUTHORIZER | STATION 6 PAY-OUT | STATION 7 TELLER(OUT) |
|-------------|-------------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 | 0.0 | -0.06 | -0.48 | -2.24 | -5.09 | -10.19 | -13.92 |
| 2 | -1.14 | 0.0 | -1.59 | 1.12 | 3.98 | 1.35 | 3.81 |
| 3 | 2.08 | -5.13 | -1.74 | -5.17 | 0.22 | 0.67 | 3.28 |
| 4 | 3.32 | 0.0 | -0.50 | -2.11 | -1.30 | -0.77 | 9.13 |
| 5 | 9.45 | 0.0 | -6.60 | -7.33 | -6.92 | -6.38 | 5.07 |
| 6 | 17.90 | -16.97 | -2.29 | -6.20 | -8.26 | -8.91 | -4.26 |
| 7 | 18.62 | 0.0 | 3.05 | 1.42 | -0.73 | 2.94 | 1.91 |
| 8 | 13.31 | 0.0 | 3.30 | -3.24 | -3.67 | 0.42 | 1.31 |
| 9 | 13.42 | -1.92 | 9.89 | -3.18 | -3.60 | -2.36 | 0.39 |
| 10 | 8.61 | 0.0 | 13.59 | 0.62 | -0.56 | -1.93 | 0.92 |
| 11 | 9.24 | 0.0 | 13.61 | -1.16 | -0.16 | -0.33 | 1.68 |
| 12 | 5.53 | 0.0 | 15.76 | 0.31 | -0.65 | -2.33 | -2.29 |
| 13 | 4.57 | 0.0 | 14.80 | -0.51 | -0.09 | 1.20 | -0.83 |
| 14 | 3.55 | 0.0 | 15.05 | 0.77 | -0.12 | 1.97 | 1.15 |
| 15 | 4.01 | 0.0 | 14.96 | -2.39 | -3.13 | -0.75 | -1.58 |
| 16 | 2.69 | 0.0 | 10.95 | 0.30 | -0.42 | 1.96 | -0.57 |
| 17 | 10.50 | -15.72 | 6.78 | 0.83 | -1.77 | 1.00 | 3.66 |
| 18 | 9.70 | 0.0 | 3.85 | -4.37 | -6.15 | -6.60 | -2.50 |
| 19 | 9.10 | 0.0 | 10.39 | -2.31 | -0.54 | -0.55 | 1.25 |
| 20 | 8.47 | -6.01 | 11.10 | -1.65 | -2.74 | -2.24 | 1.25 |
| 21 | 6.98 | 0.28 | 12.89 | -12.43 | -14.63 | -14.92 | -13.33 |
| 22 | 7.03 | -4.69 | 21.61 | 1.48 | -1.72 | -0.77 | 4.56 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

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WAITING/IDLE TIME REPORT (POSITIVE MEANS WAITING/NEGATIVE MEANS IDLE)

| ARRIVAL NO. | STATION 1--- TELLER(IN) | STATION 2--- SIGNATURE | STATION 3--- LEDGER | STATION 4--- CHECKER | STATION 5--- AUTHORIZER | STATION 6--- PAY-OUT | STATION 7--- TELLER(OUT) |
|-------------|----------------------------|---------------------------|------------------------|-------------------------|----------------------------|-------------------------|-----------------------------|
| 23 | 8.34 | -0.68 | 22.15 | 3.64 | -3.34 | -3.15 | 2.19 |
| 24 | 8.98 | 0.0 | 19.27 | 2.16 | -1.96 | -2.29 | -1.73 |
| 25 | 5.90 | 0.0 | 22.15 | 3.11 | 0.50 | -0.38 | -0.25 |
| 26 | 6.17 | -9.07 | 19.56 | 3.47 | 1.96 | 1.55 | -0.62 |
| 27 | 7.73 | -0.30 | 16.29 | -1.75 | -6.81 | -3.51 | -2.24 |
| 28 | 7.93 | 0.0 | 24.91 | 7.24 | 0.23 | -0.32 | 1.42 |
| 29 | 6.64 | 0.0 | 24.42 | 4.15 | -0.15 | 0.28 | 0.10 |
| 30 | 5.10 | 0.12 | 22.39 | 1.97 | -0.47 | -1.83 | -1.36 |
| 31 | 0.17 | 0.0 | 27.09 | 2.16 | -0.54 | -1.97 | 0.54 |
| 32 | -2.08 | -1.74 | 24.54 | 3.36 | 1.08 | -0.50 | 1.81 |
| 33 | 0.74 | 0.44 | 26.63 | 2.39 | 1.63 | 0.16 | 3.10 |
| 34 | -0.79 | 0.0 | 26.98 | 1.40 | 2.40 | 0.89 | 7.62 |
| 35 | -1.58 | 0.0 | 24.87 | 0.27 | 2.60 | 0.08 | 5.54 |
| 36 | -5.17 | 0.0 | 20.28 | -4.89 | -7.35 | -4.91 | 1.01 |
| 37 | -0.50 | 0.0 | 24.63 | 4.60 | -0.14 | -0.50 | 3.03 |
| 38 | -4.91 | 0.0 | 21.38 | 4.88 | 0.21 | -0.17 | 2.54 |
| 39 | -1.49 | 0.0 | 17.87 | -5.64 | -6.63 | -6.68 | -4.01 |
| 40 | -7.31 | -32.71 | 15.77 | -2.22 | -2.28 | -3.01 | -1.54 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 40 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 2.00 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 1.00 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 3 | 2.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 4 | 1.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.00 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 6 | 1.00 | PAY-OUT |
| MEAN OF SERVICE TIME OF STATION 7 | 2.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 76.92 | |
| UTILIZATION OF STATION 2 (%) | 12.47 | |
| UTILIZATION OF STATION 3 (%) | 89.70 | |
| UTILIZATION OF STATION 4 (%) | 46.60 | |
| UTILIZATION OF STATION 5 (%) | 29.28 | |
| UTILIZATION OF STATION 6 (%) | 32.38 | |
| UTILIZATION OF STATION 7 (%) | 61.33 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.11 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.00 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.29 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 7 | 1.71 | |
| AVERAGE WAITING TIME IN SYSTEM | 23.96 | |
| AVERAGE TIME SPENT IN SYSTEM | 34.77 | |

SIMULATION COMPLETED ***

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

PAGE 1

SERVICE TIME REPORT (ZERO SERVICE TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 PAY-OUT | STATION 3 SIGNATURE | STATION 4 LEDGER | STATION 5 CHECKER | STATION 6 AUTHORIZER | STATION 7 PAY-OUT | STATION 8 TELLER(OUT) |
|-------------|-------------------------|----------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 | 0.06 | 0.42 | 0.0 | 0.04 | 4.27 | 0.66 | 0.55 | 0.60 |
| 2 | 3.62 | 0.07 | 0.0 | 1.12 | 0.54 | 0.88 | 0.18 | 1.78 |
| 3 | 6.68 | 3.34 | 0.26 | 0.05 | 2.03 | 0.18 | 3.13 | 3.16 |
| 4 | 0.17 | 0.84 | 0.56 | 3.86 | 1.23 | 2.10 | 0.43 | 0.56 |
| 5 | 0.83 | 1.04 | 0.0 | 0.62 | 0.76 | 0.70 | 1.54 | 1.17 |
| 6 | 7.71 | 1.57 | 3.76 | 1.06 | 0.51 | 1.94 | 0.18 | 2.46 |
| 7 | 5.14 | 0.22 | 0.0 | 7.56 | 0.42 | 0.28 | 0.83 | 1.86 |
| 8 | 0.23 | 0.75 | 1.80 | 0.92 | 0.03 | 0.41 | 1.40 | 0.21 |
| 9 | 0.39 | 0.93 | 0.60 | 6.61 | 0.00 | 0.01 | 0.02 | 2.23 |
| 10 | 1.07 | 0.48 | 0.0 | 0.20 | 1.88 | 0.10 | 2.26 | 0.57 |
| 11 | 4.01 | 1.84 | 0.04 | 1.68 | 6.02 | 0.97 | 1.06 | 1.10 |
| 12 | 10.35 | 0.83 | 0.85 | 3.14 | 3.46 | 0.04 | 1.50 | 2.67 |
| 13 | 0.14 | 0.87 | 1.91 | 1.02 | 0.30 | 2.77 | 0.16 | 3.07 |
| 14 | 0.20 | 0.46 | 1.30 | 1.12 | 1.84 | 0.01 | 1.84 | 1.92 |
| 15 | 3.97 | 1.76 | 0.06 | 4.92 | 2.23 | 1.99 | 1.65 | 1.74 |
| 16 | 4.59 | 0.37 | 0.0 | 3.06 | 0.62 | 1.06 | 0.45 | 1.38 |
| 17 | 2.36 | 1.26 | 1.92 | 0.66 | 3.13 | 0.10 | 1.92 | 0.66 |
| 18 | 1.67 | 0.13 | 0.40 | 8.24 | 0.23 | 1.91 | 2.88 | 5.30 |
| 19 | 0.59 | 0.35 | 1.09 | 0.11 | 0.39 | 1.99 | 0.04 | 2.66 |
| 20 | 0.05 | 1.41 | 0.88 | 0.53 | 2.46 | 0.87 | 0.17 | 3.19 |

รายงานสถิติ 5

ENTER/EXIT TIME REPORT (ZERO TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 PAY-OUT | STATION 3 SIGNATURE | STATION 4 LEDGER | STATION 5 CHECKER | STATION 6 AUTHORIZER | STATION 7 PAY-OUT | STATION 8 TELLER(OUT) |
|-------------|-------------------------|----------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 ENTER | 0.0 | 0.06 | 0.0 | 0.48 | 0.52 | 4.79 | 5.45 | 6.00 |
| EXIT | 0.06 | 0.48 | 0.0 | 0.52 | 4.79 | 5.45 | 6.00 | 6.80 |
| 2 ENTER | 1.00 | 4.62 | 0.0 | 4.69 | 5.81 | 6.35 | 7.23 | 7.41 |
| EXIT | 4.62 | 4.69 | 0.0 | 5.81 | 6.35 | 7.23 | 7.41 | 9.19 |
| 3 ENTER | 2.53 | 11.30 | 14.64 | 14.90 | 14.96 | 16.99 | 17.17 | 20.30 |
| EXIT | 11.30 | 14.64 | 14.90 | 14.96 | 16.99 | 17.17 | 20.30 | 23.46 |
| 4 ENTER | 5.82 | 11.47 | 15.48 | 16.04 | 19.90 | 21.13 | 23.23 | 23.66 |
| EXIT | 11.47 | 15.48 | 16.04 | 19.90 | 21.13 | 23.23 | 23.66 | 24.22 |
| 5 ENTER | 11.94 | 12.77 | 0.0 | 16.52 | 20.52 | 21.89 | 23.93 | 25.47 |
| EXIT | 12.77 | 16.52 | 0.0 | 20.52 | 21.89 | 23.93 | 25.47 | 26.84 |
| 6 ENTER | 18.48 | 26.18 | 27.76 | 31.52 | 32.58 | 33.08 | 35.02 | 35.20 |
| EXIT | 26.18 | 27.76 | 31.52 | 32.58 | 33.08 | 35.02 | 35.20 | 37.66 |
| 7 ENTER | 20.07 | 31.33 | 0.0 | 31.54 | 40.14 | 40.56 | 40.84 | 41.67 |
| EXIT | 31.33 | 31.54 | 0.0 | 40.14 | 40.56 | 40.84 | 41.67 | 43.53 |
| 8 ENTER | 20.40 | 31.55 | 32.30 | 34.10 | 41.06 | 41.09 | 41.50 | 43.07 |
| EXIT | 31.55 | 32.30 | 34.10 | 41.06 | 41.09 | 41.50 | 43.07 | 43.74 |
| 9 ENTER | 21.38 | 31.94 | 33.23 | 34.70 | 47.67 | 47.67 | 47.68 | 47.71 |
| EXIT | 31.94 | 33.23 | 34.70 | 47.67 | 47.67 | 47.68 | 47.71 | 49.94 |
| 10 ENTER | 24.92 | 33.02 | 0.0 | 33.71 | 47.87 | 49.75 | 49.85 | 52.11 |
| EXIT | 33.02 | 33.71 | 0.0 | 47.87 | 49.75 | 49.85 | 52.11 | 52.68 |
| 11 ENTER | 27.17 | 37.03 | 38.87 | 38.91 | 49.55 | 55.77 | 56.74 | 57.80 |
| EXIT | 37.03 | 38.87 | 38.91 | 49.55 | 55.77 | 56.74 | 57.80 | 58.90 |
| 12 ENTER | 27.37 | 47.37 | 48.20 | 49.05 | 52.70 | 59.23 | 59.27 | 60.77 |
| EXIT | 47.37 | 48.20 | 49.05 | 52.70 | 59.23 | 59.27 | 60.77 | 63.45 |
| 13 ENTER | 28.57 | 47.52 | 49.07 | 50.98 | 53.71 | 59.53 | 62.31 | 62.47 |
| EXIT | 47.52 | 49.07 | 50.98 | 53.71 | 59.53 | 62.31 | 62.47 | 66.52 |
| 14 ENTER | 40.31 | 47.72 | 49.52 | 52.28 | 54.83 | 61.37 | 62.31 | 64.31 |
| EXIT | 47.72 | 49.52 | 52.28 | 54.83 | 61.37 | 62.31 | 64.31 | 66.44 |
| 15 ENTER | 48.49 | 52.46 | 54.22 | 54.28 | 59.75 | 63.61 | 65.60 | 67.25 |
| EXIT | 52.46 | 54.22 | 54.28 | 59.75 | 63.61 | 65.60 | 67.25 | 70.18 |

ENTER/EXIT TIME REPORT (ZERO TIME MEANS BYPASS)

| ARRIVAL NO. | STATION 1--- TELLER(IN) | STATION 2--- PAY-OUT | STATION 3--- SIGNATURE | STATION 4--- LEDGER | STATION 5--- CHECKER | STATION 6--- AUTHORIZER | STATION 7--- PAY-OUT | STATION 8--- TELLER(OUT) |
|-------------|----------------------------|-------------------------|---------------------------|------------------------|-------------------------|----------------------------|-------------------------|-----------------------------|
| 16 ENTER | 52.25 | 57.04 | 0.0 | 57.42 | 62.81 | 64.23 | 66.67 | 67.70 |
| EXIT | 57.04 | 57.42 | 0.0 | 62.81 | 64.23 | 66.67 | 67.70 | 71.56 |
| 17 ENTER | 53.40 | 59.40 | 60.66 | 62.59 | 63.47 | 67.36 | 67.46 | 69.62 |
| EXIT | 59.40 | 60.66 | 62.59 | 63.47 | 67.36 | 67.46 | 69.62 | 72.22 |
| 18 ENTER | 54.25 | 61.07 | 61.20 | 62.98 | 71.70 | 71.93 | 73.84 | 76.72 |
| EXIT | 61.07 | 61.20 | 62.98 | 71.70 | 71.93 | 73.84 | 76.72 | 82.02 |
| 19 ENTER | 62.79 | 63.38 | 63.72 | 64.81 | 71.81 | 72.32 | 75.83 | 76.76 |
| EXIT | 63.38 | 63.72 | 64.81 | 71.81 | 72.32 | 75.83 | 76.76 | 84.70 |
| 20 ENTER | 68.44 | 68.49 | 69.91 | 70.79 | 72.34 | 74.80 | 76.70 | 76.93 |
| EXIT | 68.49 | 69.91 | 70.79 | 72.34 | 74.80 | 76.70 | 76.93 | 87.89 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

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WAITING/IDLE TIME REPORT (POSITIVE MEANS WAITING/NEGATIVE MEANS IDLE)

| ARRIVAL NO. | STATION 1 TELLER(IN) | STATION 2 PAY-OUT | STATION 3 SIGNATURE | STATION 4 LEDGER | STATION 5 CHECKER | STATION 6 AUTHORIZER | STATION 7 PAY-OUT | STATION 8 TELLER(OUT) |
|-------------|-------------------------|----------------------|------------------------|---------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 | 0.0 | -0.06 | 0.0 | -0.48 | -0.52 | -4.79 | -5.45 | -6.00 |
| 2 | -0.04 | -4.13 | 0.0 | -4.17 | -1.02 | -0.89 | -1.23 | -0.61 |
| 3 | 2.08 | -6.61 | -14.64 | -9.09 | -8.61 | -9.76 | -9.76 | -11.10 |
| 4 | 5.48 | 3.17 | -0.57 | -1.08 | -2.91 | -3.96 | -2.93 | -0.20 |
| 5 | -0.47 | 2.70 | 0.0 | 3.38 | 0.61 | 1.34 | -0.27 | -1.25 |
| 6 | -5.70 | -9.67 | -11.72 | -11.00 | -10.68 | -9.16 | -9.55 | -8.56 |
| 7 | 6.11 | -3.57 | 0.0 | 1.03 | -7.06 | -5.54 | -5.63 | -4.00 |
| 8 | 10.92 | -0.01 | -0.78 | 6.04 | -0.50 | -0.25 | 0.16 | 0.46 |
| 9 | 10.17 | 0.35 | 0.87 | 6.37 | -6.58 | -6.17 | -4.62 | -3.97 |
| 10 | 7.02 | 0.22 | 0.0 | 13.96 | -0.20 | -2.07 | -2.15 | -2.17 |
| 11 | 9.85 | -3.32 | -4.17 | 8.96 | 0.20 | -5.92 | -4.63 | -5.12 |
| 12 | 9.65 | -8.50 | -9.29 | 0.50 | 3.07 | -2.49 | -1.47 | -1.87 |
| 13 | 18.80 | 0.68 | -0.02 | 1.72 | 5.52 | -0.26 | -1.53 | 0.97 |
| 14 | 7.21 | 1.34 | 1.45 | 1.44 | 4.70 | 0.93 | 0.16 | 2.21 |
| 15 | -0.77 | -2.94 | -1.94 | 0.55 | 1.62 | -1.29 | -1.29 | 1.19 |
| 16 | 0.21 | -2.82 | 0.0 | 2.34 | 0.80 | 1.37 | 0.58 | 2.48 |
| 17 | 3.65 | -1.98 | -6.38 | 0.23 | 0.76 | -0.69 | 0.24 | 1.94 |
| 18 | 9.15 | -0.41 | 1.38 | 0.48 | -4.34 | -4.47 | -4.23 | -4.50 |
| 19 | -1.72 | -2.17 | -0.74 | 6.89 | 0.12 | 1.53 | 0.89 | 5.26 |
| 20 | -5.07 | -4.77 | -5.09 | 1.03 | -0.02 | 1.03 | 0.05 | 7.77 |

SIMULATION OF BANK DEPOSIT CUSTOMER SERVICE PROCEDURE : SAMPLE BRANCH

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SUMMARY REPORT ***

| | | |
|-----------------------------------|-------|-------------|
| NO. OF ARRIVALS TO BE SIMULATED | 20 | |
| MEAN OF INTERARRIVAL TIME | 3.00 | |
| MEAN OF SERVICE TIME OF STATION 1 | 2.00 | TELLER(IN) |
| MEAN OF SERVICE TIME OF STATION 2 | 1.00 | PAY-OUT |
| MEAN OF SERVICE TIME OF STATION 3 | 1.00 | SIGNATURE |
| MEAN OF SERVICE TIME OF STATION 4 | 2.00 | LEDGER |
| MEAN OF SERVICE TIME OF STATION 5 | 1.50 | CHECKER |
| MEAN OF SERVICE TIME OF STATION 6 | 1.00 | AUTHORIZER |
| MEAN OF SERVICE TIME OF STATION 7 | 1.00 | PAY-OUT |
| MEAN OF SERVICE TIME OF STATION 8 | 2.00 | TELLER(OUT) |
| UTILIZATION OF STATION 1 (%) | 78.60 | |
| UTILIZATION OF STATION 2 (%) | 27.09 | |
| UTILIZATION OF STATION 3 (%) | 21.01 | |
| UTILIZATION OF STATION 4 (%) | 64.31 | |
| UTILIZATION OF STATION 5 (%) | 43.25 | |
| UTILIZATION OF STATION 6 (%) | 24.75 | |
| UTILIZATION OF STATION 7 (%) | 28.85 | |
| UTILIZATION OF STATION 8 (%) | 43.82 | |
| AVERAGE WAITING TIME AT STATION 1 | 0.04 | |
| AVERAGE WAITING TIME AT STATION 2 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 3 | 0.00 | |
| AVERAGE WAITING TIME AT STATION 4 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 5 | 0.01 | |
| AVERAGE WAITING TIME AT STATION 6 | 0.00 | |
| AVERAGE WAITING TIME AT STATION 7 | 0.03 | |
| AVERAGE WAITING TIME AT STATION 8 | 1.11 | |
| AVERAGE WAITING TIME IN SYSTEM | 10.37 | |
| AVERAGE TIME SPENT IN SYSTEM | 22.71 | |

SIMULATION COMPLETED ***

ประวัติโดยสังเขป

ชื่อ

นายสุพจน์ เมธีวรพจน์

การศึกษา

วิทยาศาสตรบัณฑิต สาขาวิชาคณิตศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2516

การทำงาน

เจ้าหน้าที่โท ส่วนควบคุมระบบประมวลผล ฝ่ายประมวลบัญชีกลาง
ธนาคารกรุงเทพ จำกัด ปัจจุบันทำหน้าที่เป็น System Programmer