$Seeds = X_i, Multiplier = a, \text{Increment} = c, \text{Modulus} = m$

$$X_{i+1} = (aX_i + c) mod(m); i = 0, 1, 2, 3, \ldots$$

$D_\alpha \Rightarrow$ Critical Value $N = 10$

From Table A.8 = 0.4100

X_o	=	8
a	=	7
c	=	0
m	=	16

Sr	Xn	Mod Value	Random Number	Convert to smallest to largest	R(i)	Random Number (Reorder)
1	56	8	0.500		1	0.500
2	56	8	0.500		2	0.500
3	56	8	0.500		3	0.500
4	56	8	0.500		4	0.500
5	56	8	0.500		5	0.500
6	56	8	0.500		6	0.500
7	56	8	0.500		7	0.500
8	56	8	0.500		8	0.500
9	56	8	0.500		9	0.500
10	56	8	0.500		10	0.500

Step 01

i	1	2	3	4	5	6	7	8	9	10
R(i)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
i/N	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Step 02 $D^+ = \frac{i}{N} - R_i$	-	-	-	-	-	0.1000	0.2000	0.3000	0.4000	0.5000
$D^- = R_i - \frac{i-1}{N}$	0.5	0.4	0.3	0.2	0.1	0	-0.1	-0.2	-0.3	-0.4
$\alpha \leftarrow\!-\!-$ Level of significane	=	0.05								
Step 3: $D = \max(D^+, D^-)$	0.5000	0.4000	0.3000	0.2000	0.1000	0.1000	0.2000	0.3000	0.4000	0.5000

$D^+\{max\} =$ 0.5000

$D^-\{max\} =$ 0.5

$D = \max(D^+, D^-) =$ 0.5000

sample statistic D is greater than the critical value D_α, the null hypothesis that the data are a sample from a uniform distribution is rejected. In this case, it is rejected.

Chapter 07: Q15 (d) CS312 Computer Simulation , with N=10, Mohammad Abubakar Atiq, F202231002, BSIE, Department of Mechanical Engineering

$Seeds = X_i, Multiplier = a, \text{Increment} = c, \text{Modulus} = m$

$$X_{i+1} = (aX_i + c) mod(m); i = 0, 1, 2, 3, \ldots$$

$D_\alpha \Rightarrow$ Critical Value $N = 10$

From Table A.8 = 0.4100

X_o	=	7
a	=	7
c	=	0
m	=	16

Sr	Xn	Mod Value	Random Number	Convert to smallest to largest	R(i)	Random Number (Reorder)
1	49	1	0.063		1	0.063
2	7	7	0.438		2	0.063
3	49	1	0.063		3	0.063
4	7	7	0.438		4	0.063
5	49	1	0.063		5	0.063
6	7	7	0.438		6	0.438
7	49	1	0.063		7	0.438
8	7	7	0.438		8	0.438
9	49	1	0.063		9	0.438
10	7	7	0.438		10	0.438

Step 01

i	1	2	3	4	5	6	7	8	9	10
R(i)	0.0625	0.0625	0.0625	0.0625	0.0625	0.4375	0.4375	0.4375	0.4375	0.4375
i/N	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Step 02 $D^+ = \frac{i}{N} - R_i$	0.0375	0.1375	0.2375	0.3375	0.4375	0.1625	0.2625	0.3625	0.4625	0.5625
$D^- = R_i - \frac{i-1}{N}$	0.0625	-	-	-	-	-	-	-	-	-
$\alpha \rightarrow$ Level of significane	=	0.05								
Step 3: $D = \max(D^+, D^-)$	0.0625	0.1375	0.2375	0.3375	0.4375	0.1625	0.2625	0.3625	0.4625	0.5625

$D^+\{max\} =$ 0.5625

$D^-\{max\} =$ 0.0625

$D = \max(D^+, D^-) =$ 0.5625

Sample statistic D is greater than the critical value D_α, the null hypothesis that the data are a sample from a uniform distribution is rejected. In this case, it is rejected.

Chapter 07: Q15 (c) CS312 Computer Simulation , with N=10, Mohammad Abubakar Atiq, F202231002, BSIE, Department of Mechanical Engineering

$Seeds = X_i, Multiplier = a, \text{Increment} = c, \text{Modulus} = m$

$$X_{i+1} = (aX_i + c) mod(m); i = 0, 1, 2, 3, \ldots$$

$D_\alpha \Rightarrow$ Critical Value $N = 10$ — From Table A.8 = 0.4100

X_o	=	8
a	=	11
c	=	0
m	=	16

Step 01

Sr	Xn	Mod Value	Random Number	Convert to smallest to largest	R(i)	Random Number (Reorder)
1	88	8	0.500		1	0.500
2	88	8	0.500		2	0.500
3	88	8	0.500		3	0.500
4	88	8	0.500		4	0.500
5	88	8	0.500		5	0.500
6	88	8	0.500		6	0.500
7	88	8	0.500		7	0.500
8	88	8	0.500		8	0.500
9	88	8	0.500		9	0.500
10	88	8	0.500		10	0.500

i	1	2	3	4	5	6	7	8	9	10
R(i)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
i/N	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Step 02 $D^+ = \frac{i}{N} - R_i$	-	-	-	-	-	0.1000	0.2000	0.3000	0.4000	0.5000
$D^- = R_i - \frac{i-1}{N}$	0.5	0.4	0.3	0.2	0.1	0	-0.1	-0.2	-0.3	-0.4
Step 3: $D = \max(D^+, D^-)$	0.5000	0.4000	0.3000	0.2000	0.1000	0.1000	0.2000	0.3000	0.4000	0.5000

$\alpha = \longrightarrow$ Level of significance = 0.05

$D^+\{max\} =$ 0.5000

$D^-\{max\} =$ 0.5

$D = \max(D^+, D^-) =$ 0.5000

sample statistic D is greater than the critical value D_α, the null hypothesis that the data are a sample from a uniform distribution is rejected. In this case, it is rejected.

Chapter 07: Q15 (b) CS312 Computer Simulation , with N=10, Mohammad Abubakar Atiq, F202231002, BSIE, Department of Mechanical Engineering

$Seeds = X_i, Multiplier = a, \text{Increment} = c, \text{Modulus} = m$

$$X_{i+1} = (aX_i + c) mod(m); i = 0, 1, 2, 3, \ldots$$

$D_\alpha \Rightarrow$ Critical Value $N = 10$

From Table A.8 = 0.4100

X_o	=	7
a	=	11
c	=	0
m	=	16

Sr	Xn	Mod Value	Random Number	Convert to smallest to largest	R(i)	Random Number (Reorder)
1	77	13	0.813		1	0.313
2	143	15	0.938		2	0.313
3	165	5	0.313		3	0.438
4	55	7	0.438		4	0.438
5	77	13	0.813		5	0.813
6	143	15	0.938		6	0.813
7	165	5	0.313		7	0.813
8	55	7	0.438		8	0.938
9	77	13	0.813		9	0.938
10	143	15	0.938		10	0.938

Step 01

i	1	2	3	4	5	6	7	8	9	10
R(i)	0.3125	0.3125	0.4375	0.4375	0.8125	0.8125	0.8125	0.9375	0.9375	0.9375
i/N	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Step 02 $D^+ = \frac{i}{N} - R_i$	-	-	-	-	-	-	-	-	-	0.0625
$D^- = R_i - \frac{i-1}{N}$	0.3125	0.2125	0.2375	0.1375	0.4125	0.3125	0.2125	0.2375	0.1375	0.0375
$\alpha = \longrightarrow$ Level of significane	=	0.05								
Step 3: $D = \max(D^+, D^-)$	0.3125	0.2125	0.2375	0.1375	0.4125	0.3125	0.2125	0.2375	0.1375	0.0625

$D^+\{max\} =$ 0.0625

$D^-\{max\} =$ 0.4125

$D = \max(D^+, D^-) =$ 0.4125

sample statistic D is greater than the critical value D_α, the null hypothesis that the data are a sample from a uniform distribution is rejected. In this case, it is rejected.

Chapter 07: Q15 (a) CS312 Computer Simulation , with N=10, Mohammad Abubakar Atiq, F202231002, BSIE, Department of Mechanical Engineering