USAMA SARWAR
FA17-BCS-090

ARTIFICIAL INTELLIGENCE

SESSIONAL # 02

COMSATS University Islamabad
Sahiwal Campus

Q#02

Maximize the value of the function $f(x)$------ compare it to old generation

Sol:

$f(x) = x + 3$ i range 0 to 31 $\Rightarrow \boxed{2^5 = 32}$ Step1.

2^5

Step 2

Fitness Function

$x + 3$

Step3

Population

	16	8	4	2	1
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1

(2)

	16	8	4	2	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

Step 4

Select any 4 individual from population
(00111, 01001, 01010, 01100)

Step 5

Evalele the fitness of slected individuals.

String	Phenotype	chromosome	fitness	probability
1	7	00111	10	0.2
2	9	01001	12	0.24
3	10	01010	13	0.26
4	12	01100	15	0.3
Sum			50	1
Avg			12.5	0.25
Max			15	0.3

Expected cont (N * Probility)

4 x 0.2 = 0.8
0.96
1.04
1.2

Max	1.2
Avg	1
Sum	4

6) Associated Bin :-

Str	Chromosome	Bin
1	00111	0 — 0.2
2	01001	0.2 — 0.44
3	01010	0.44 — 0.7
4	01100	0.7 — 1

7) Pairing of Random choose:-

	Random	Pairing	chromosome
2	0.21	(2,4)	01001
3	0.61	(3,4)	01010
4	0.70		01100
4	0.95		01100

8) Cross over function:-

Pair 1 (2,4)

P_1 = 01|101 } 01000

P_2 = 01|100 } 01101

Pair 2 (3,4)

P_1 = 01|010 } 01000

P_2 = 01|100 } 01110

9) Mutation :-

01000	01101
01101	01000
01000	01101
01110	01001

10) Re-evaluate :-

String	Pheotype	chromosome	fit	Prob
1	13	01101	16	0.29090
2	8	01000	11	0.2
3	13	01101	16	0.290909
4	9	01001	12	0.218181
Sum			55	0.999 ≈ 1
Avg			13.75	0.25
Max			16	0.29

New Probability $1(0.999) < 1$