Qn3.a Genetic Algorithm

For the given data in genetic algorithm, construct the roulette wheel and determine 6 samples to be selected for matting based on the random numbers given below:

Number of individual	1	2	3	4	5	6	7
Fitness value	9	10	11	8	1	12	14
Selection Probability Interval							

Random Numbers (0,1)	0.02	0.39	0.32	0.75	0.9	0.15
Sample selected for matting						

Solution and answer

Number of individual	1	2	3	4	5	6	7
Fitness value	9	10	11	8	1	12	14
Selection Probability Interval	A 0.138	B 0.292	C 0.461	D 0.584	E 0.599	F 0.784	G 1

A = 9/(9+10+11+8+1+12+14) = 9/65 = 0.138 (rounded)
B = A+10/65 = 0.138+0.154 = 0.292
C = B+11/65 = 0.292+0.+0.169 = 0.461
D = C+8/65 = 0.461+0.123 = 0.584
E = D+1/65 = 0.584+0.015 = 0.599
F = E+12/65 = 0.599+0.185 = 0.784
G = F+14/65 = 0.784+0.215 = 1 (Rounded. Make sure result is close to 1)

Random Numbers (0,1)	0.02	0.39	0.32	0.75	0.9	0.15
Sample selected for matting	a 1	b 3	c 3	d 6	e 7	f 2

0.02<A, so a = 1
B<0.39<C, so b = 3
B<0.32<C, so c = 3
E<0.75<F, so d = 6
F<0.9<G, so e = 7
A<0.15<B, so f = 2

Answer: 1,3,3,6,7,2

Qn3.b Genetic Algorithm

For given probabilities, determine 6 matting samples when you use Stochastic Universal Sampling technique? Assume the sample of 1 random number in the range [0, 1/6] is 0.15.

Number of individual	1	2	3	4	5	6	7
Selection Probability Interval	0.11	0.35	0.4	0.68	0.75	0.99	1

Intervals						
Individual selected for matting						

Solution and answer

For given probabilities, determine 6 matting samples when you use Stochastic Universal Sampling technique? Assume the sample of 1 random number in the range [0, 1/6] is 0.15.

Number of individual	1	2	3	4	5	6	7
Selection Probability Interval	0.11	0.35	0.4	0.68	0.75	0.99	1

Intervals	0.15	0.317	0.484	0.651	0.818	0.985
Individual selected for matting	A 2	B 2	C 4	D 4	E 6	F 6

Interval length is ⅙ = 0.167
1st: 0.11 < 0.15 < 0.35, so A = 2
2nd: 0.15+0.167=0.317, 0.11 < 0.317 < 0.35, so B = 2
3: 0.317+0.167=0.484, 0.4 < 0.484 < 0.68, so C = 4
4: 0.484+0.167=0.651, 0.4 < 0.651 < 0.68, so D = 4
5: 0.651+0.167=0.818, 0.75 < 0.818 < 0.99, so E = 6
6: 0.818+0.167=0.985, 0.75 < 0.985 < 0.99, so F = 6

Answer: 2,2,4,4,6,6