Problem Assignment 1: 1-15

Sunday, March 5, 2023 3:00 PM

Q1. True

This is how it is defined in the slides

Q2. 2 This values Pheromones more than heuristic

Q3: 4, by using the rules given, we should reach 4 ticks

Q4: 30

0	0
1	1
2	1
3	1
4	1
5	0
6	0
7	0

Binary to decimal

7 6 5 4 3 2 1 0

0 0 0 1 1 1 1 0

$(1\times2^4)+(1\times2^3)+(1\times2^2)+(1\times2^1)$

$16 + 8 + 4 + 2 = 30$

Q5. Find out the rules

answer

= ■ = 1

= □ = 0

000	000	000	000	000	000	000	000	000	000	000
000	000	000	000	000	000	000	000	000	000	000
000	000	000	000	000	000	000	000	000	000	000
000	000	000	000	000	000	000	000	000	000	000
000	000	000	000	000	000	000	000	000	000	000
			X	X	X					

000 = 0 111 = 0

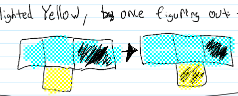
001 = 1

010 = 1

011 = 1

110 = 1

we can determine how to fill out the correct spot, highlighted Yellow, ~~by~~ once figuring out the rules



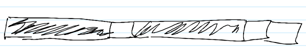
≈ 0 0 1

Q6:

We repeat the steps we did in Question 5

- figure out the rules, then apply the after the last row
- rules will be different, since it's a different problem

Q7.



Not sure why given that the rules is boundary ~~#~~ reflection

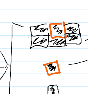
Q8: 76 Binary to decimal

0	0
1	0
2	1
3	1
4	0
5	0
6	1
7	0

$(1\times2^6)+(1\times2^3)+(1\times2^2)$

$64 + 8 + 4 = \boxed{76}$

Q9. w,w,B



W, W, B

11. Reversion Mutation

2 5 9 3 0 6 9 8 7 1

2 5 9 3 8 9 6 0 7 1

Reversion mutation focuses on reversing the order from a certain spot

From the possible answers provided, this followed the correct reverse order

12. 348 | 4 21 | 579

076 | 5 31 | 824

$\boxed{348\ 531\ 579}$ or $\boxed{076\ 421\ 824}$

A two point crossover was done after 3rd bit and 6th bit

DON'T CHANGE | CHANGE | DON'T CHANGE

13. L = 5 p = 0.2

Step 1: apply $(1-P)^L$

$(1-0.2)^5 =$

Step 2 subtract $1-0.32728 = 0.627$

$\boxed{0.63}$

We only care about the probability of one chromosome changing not all of them
So we can use the formula in the step one, this is used for probability of not changing

Once we get the result of the probability of not changing, we can subtract it by 1, since we only care about one of them changing not all

14. $\frac{f_i}{\sum_N f_i} \approx \frac{7}{11+12+9+20+17+30+8+14} \approx \frac{7}{121} \rightarrow 0.057$

$\boxed{0.06}$

We use the fitness formula in order to figure it out , it is given in the first slides : intelligence and evolution

15.

	A	B	C	D	e	f
X1 =	5	8	4	6	0	9
X2 =	5	6	8	1	6	0

	A	B	C	D	e	f
X3 =	1	3	9	0	4	1
X4 =	9	0	9	2	6	1

$f(x) = (a+c+e) - (b+d+f)$

4 $X1 \quad 5+4+0 - 8+6+9 = 14$

2 $X_2 = (5+8+6) - (6+1+0) = 12$

3 $X3 = (1+9+4) - (3+0+1) = 10$

1 $X4 = (9+9+6) - (0+2+1) = 21$

a. X4, X2, X3, X1

One point Cross over 1st & 2nd fittest

909 | 261

568 | 160

b. 909 160, 568 261

Two point crossover between 2nd fittest & 3rd fittest

56 | 81 | 60

13 | 90 | 41

c. 569060, 138141

D. 23, We need to consider the new ones

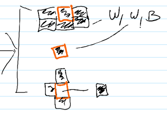
$f(x) = (a+c+e) - (b+d+f)$

A	B	C	D	e	f
9	0	9	1	6	0
5	6	8	2	6	1
5	6	9	0	6	0
1	3	8	1	4	1

$(9+9+6) - (0+1+0) = \boxed{23}$

This is the highest value after doing doing the others and only option

Q9. W, W, B



If alive neighbors = 3 or 2 , indicated spot stay alive, otherwise dies if
If dead cell has only 3 neighbors alive then it becomes alive

1. example becomes dies because it has too many neighbors (W)
2. Dies because it has no neighbors
3. Becomes alive because it has exactly three neighbors

Q10. 0.000016

$(1-p_m)^L$ probability of not happening

$(p)^L$ probability of happening

$(0.16)^6 = 0.000016$

We use This rule