Evolution, Ecology and Behavior

Practical answer sheet

Minor points

1) Total points add up to 99.1.
2) Part A-2: 1.5 points for each statement (7.5 points in total)
3) C-3-2: 9.6 points in total.
4) All frequencies and heterogeneity, and correlations were evaluated by student's data.
5) In C-3-1 we considered data points ± 1.5 as correct.
6) For correlation (based on the student's data, r ± 0.02 was considered correct)

PART A: (20 points)

A-1) Based on the observed results on plates, fill the table 1 in the answer sheet. (Correct to two digits after decimal point) (8.5 points – 0.2 point for each count and frequency; 0.5 point for each H.)

Table 1:

Plate	SM (Count)	WS (Count)	FS (Count)	SM (Freq)	WS (Freq)	FS (Freq)	H
A0	17	0	0	1.00	0.00	0.00	0.00
A7	8	7	5	0.40	0.35	0.25	0.66
B7	8	7	5	0.40	0.35	0.25	0.66
A14	9	9	6	0.38	0.38	0.25	0.66
B14	16	2	5	0.70	0.09	0.25	0.46

A-2) Based on the data obtained, indicate if each of the following statements is true or false with a "✓". (1.5 points)

	True	False
A		✓
B	✓	
C		✓
D	✓	
E	✓	

A-3) Assuming that there are only three bacterial morphs, calculate maximum achievable heterogeneity (Correct to two digits after decimal point) (2.5 points).

0.67

0.0625
0.5625

0.1225
0.4225

PART B: (20 points)

B-1) indicate if each of the following statements is true or false with a "✓". (15 points, 3 points each)

	True	False
A		✓
B	✓	
C	✓	
D		✓
E		✓

B-2) Indicate which of the following equations about equilibrium heterogeneity best fit with simulation results. Indicate the true choice with a "✓". (5 points)

A	B	C	D	E
✓				

PART C: (60 points)

C-1) Using the film from the fruit flies larva, complete the table below (Use the same method as part A to calculate H; Correct to two digits after decimal point; 0.5 point for each count; 0.5 point for each H; 0.2 point for each frequency.) (9.5 points)

Table 2:

No. of generation	Sitters (count)	Active rovers (count)	Sitters (freq)	active rovers (freq)	*H*
1	3-4	17-16	0.15-0.2	0.85-0.8	0.26-0.32
2	9	11	0.45	0.55	0.49
3	17	3	0.85	0.15	0.26
4	11	9	0.55	0.45	0.49
5	3-4-5	17-16-15	0.15-0.2-0.25	0.85-0.8-0.75	0.26-0.32-0.38

C-2) indicate if each of the following statements is true or false with a "✔". (1.5 points) (6 points)

	True	False
A		✓
B		✓
C	✓	
D	✓	

C-3-1) Complete the table below based on model I and model II. Parameters of model are as follow (Correct to two digits after decimal point) (0.25 points for each box in model I and 0.75 points for each box in model II) (14 points)

Table 3:

No. of generation	**Model I**	**Model II**	
	Sitter (count)	Sitter (count)	Rover(count)
0	184.00	184.00	262.00
1	532.86	503.94	492.14
2	427.79	343.22	408.41
3	613.13	581.97	501.97
4	196.94	120.45	381.17
5	555.05	367.21	543.98
6	371.71	539.93	368.38
7	657.83	291.24	482.77
8	34.89	571.68	459.81
9	132.24	168.11	428.59
10	424.04	459.64	522.19
11	617.30	426.93	379.83
12	182.86	516.81	497.54
13	530.81	310.41	399.58
14	432.68	589.09	510.47
15	607.45	93.76	368.81

C-3-2) Calculate frequencies of feeding strategies predicted by these two models and fill the table below (For model I, since we have rovers in the population in addition to the sitters, to calculate the frequency of the sitters divide the number of sitter by 2 × K); Correct to two digits after decimal point).
Table 4: (each box 0.2 points) (9 points)

	Result of our study	**Prediction of model I**	**Prediction of model II**	
No. of generation	Sitter	Sitters	Sitter	Active rover
0	0.41	0.18	0.41	0.59
1	0.54	0.53	0.51	0.49
2	0.61	0.43	0.46	0.54
3	0.62	0.61	0.54	0.46
4	0.91	0.20	0.24	0.76
5	0.32	0.56	0.40	0.60
6	0.68	0.37	0.59	0.41
7	0.63	0.66	0.38	0.62
8	0.46	0.03	0.55	0.45
9	0.27	0.13	0.28	0.72
10	0.84	0.42	0.47	0.53
11	0.67	0.62	0.53	0.47
12	0.47	0.18	0.51	0.49
13	0.39	0.53	0.44	0.56
14	0.42	0.43	0.54	0.46
15	0.54	0.61	0.20	0.80

C-3-3) Indicate the true choice with a "✓". (2 points)

A	B	C	D
	✓		

C-4) Calculate correlation coefficient (r) for the desired correlations and fill in the table below. (7.75 points for each)

Sample x	Observed sitters (frequency)	Observed sitters (frequency)
Sample y	Sitters predicted by model I (frequency)	Sitters predicted by model II (frequency)
Correlation coefficient	0.16	0.01

C-5) Indicate each of the following statements is true or false with a "✓" in the answer sheet. (4 points)

	True	False
A		✓
B		✓
C	✓	
D		✓