

Do not write your name on this exam, ONLY your student number, above. This is a closed book exam. Questions have different mark values: read them carefully and budget your time accordingly. Remember to observe university regulations on academic honesty.

1. A small desert plant shows the following patterns of mortality with respect to individual age in the absence of any herbivory:

Age (weeks)	Number of survivors (starting population = 1000)
0	1000
1	950
2	900
3	850
4	800
5	500
6	250

The same plant species shows this mortality pattern in the presence of a herbivorous beetle:

Age (weeks)	Number of survivors (starting population = 1000)
0	1000
1	400
2	100
3	60
4	40
5	20
6	10

Compare and contrast survivorship curves for this plant species in the two datasets. Use graphs. Ensure you explain the differences thoroughly and specifically. (6 marks)

2. Carefully explain the hypothesis that “mountain passes are higher in the tropics” and how it might help explain global patterns of species diversity. (4 marks)

3. Describe the climate in a locale with the following annual climatic patterns using a climate graph, describe the vegetation that results from this climate pattern, and which part of the world you would be in. (4 marks):

	January	March	June	September	December
PET (mm/yr)	0	250	900	500	50
Precip	250	350	100	150	200

4. A plant species found on an island occupies the following habitats: coastal sage scrub, inland forest, alpine forest. After the introduction of a second plant species, the first species occupies only coastal sage scrub habitat. The introduced species occupies inland forest and alpine forest. Explain these observations in detail. (4 marks)

5. Consider a location 200 km north of Ottawa. Describe this location’s ecozone, current vegetation, and dominant animal species. If substantial climate warming occurs, the location will begin to resemble the ecozone in which Ottawa is found. What ecozone will the location resemble in the future and how are its vegetation and animal species likely to differ in the future? Provide specific examples. (4 marks)

6. Analyze the following data.

Cumulative population % (ranked poorest to wealthiest)	Cumulative % GNP controlled, COUNTRY 1	Cumulative % GNP controlled, COUNTRY 2
20%	3.6	8.5
40%	8.9	13
60%	14.9	20
80%	23	24
100%	49.6	34.5

Both countries in this dataset have equal per capita GNP. Given this information, describe how human population growth rates will likely differ between them, and explain in detail. Use fully labeled graphs to support your conclusion. (6 marks)

7. A biologist observes that an invertebrate species' population growth through several weeks. The population reproduces continuously with a growth rate of 4% per week during the period of observation.

a. If the starting population is 1400 individuals, what will the population size be after 12 weeks? Show ALL calculations and formulae (4 marks).

b. After 12 weeks, the population growth rate per week begins to change, according to these data:

Week	Growth rate per week
13	2.50%
14	1.00%
15	0.5%
16	0%
17	0%
18	-45%
19	0%
20	0%

Describe, using a labeled graph, how growth has changed and fully explain the trend you have illustrated. What factors could have caused this change? (4 marks)