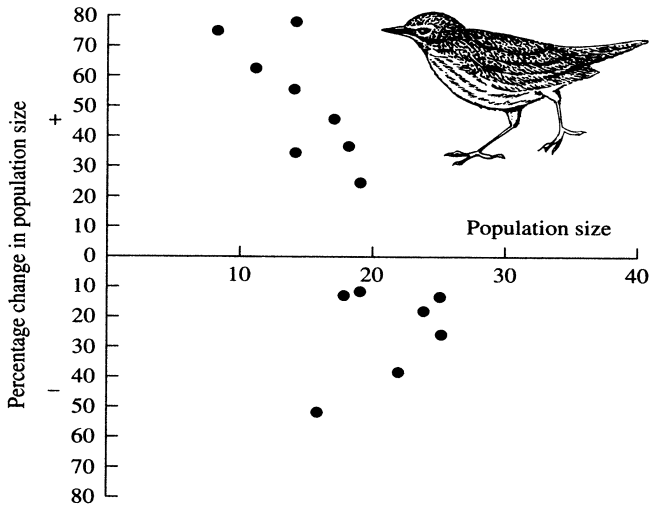
BIO 301M – Ecology, Evolution, and Society NAME _____
EXAM TWO 31 March 2011

1. Which of the following is an accurate statement about this figure?

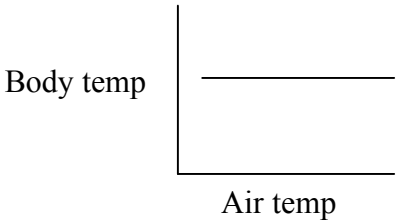


a.) most larger populations have larger R_o
b.) most larger populations have smaller R_o
c.) most smaller populations have smaller R_o
d.) birth rates and death rates are equal in all populations
e.) the largest population has 80 individuals

2. Which animal uses the most energy per gram per hour?

a.) mouse
b.) elephant
c.) shrew
d.) snake
e.) ferret

3. The following graph best describes thermoregulation abilities of a _____.

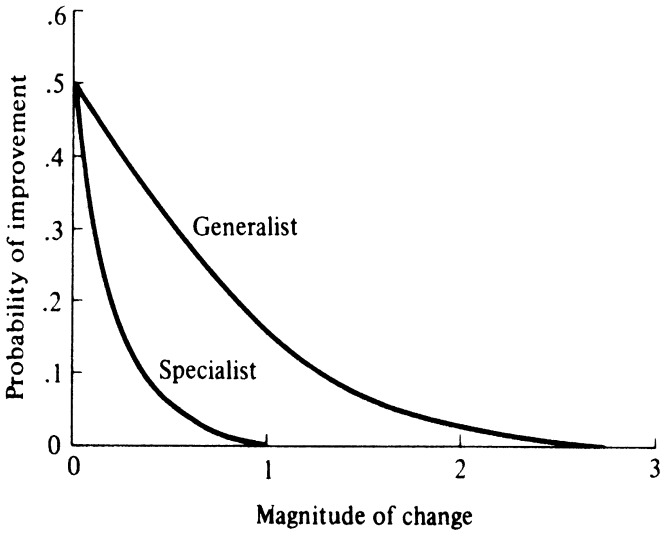


a.) thermoconformer
b.) homeotherm
c.) ectotherm
d.) poikilotherm
e.) dead organism

4. The following are components of assimilation, EXCEPT.

a.) egestion
b.) growth
c.) reproduction
d.) respiration
e.) productivity

5. The following inferences could be made from this figure, EXCEPT ___.



a.) For generalists, changes of larger magnitude are less likely to improve an organisms fitness
b.) For specialist, changes of larger magnitude are less likely to improve an organisms fitness
c.) Probability of improvement declines for generalist and specialists at the same rate
d.) For specialists, smaller changes are more likely to improve an organisms fitness
e.) For generalists, smaller changes are more likely to improve an organisms fitness

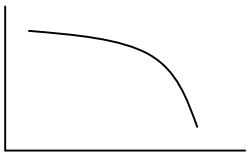
6. A population with very high infant mortality, almost as high juvenile mortality, and a declining mortality rate with age has what kind of survivorship curve?

a.) Type 1: Rectangular
b.) Type 2: diagonal
c.) Type 3: inverse hyperbolic
d.) Type 4: increasing
e.) Type 5: random

7. A possible proximate explanation for high murder rates in 20-30 year old males is ___.

a.) males that murder survive and produce more offspring
b.) increased production of testosterone and aggression during that age period
c.) women are attracted and willing to mate with murderers
d.) younger murders are likely to get out of jail and mate before death
e.) most ancient humans lived to age 30, so murder did not change survivorship

8. A survivorship curve that looks like the following describes a population with _____.



a.) a constant death rate
b.) high infant and juvenile mortality
c.) a decrease in death rate at middle age
d.) higher mortality in males compared to females
e.) low infant and juvenile mortality and most individuals living to old age

9. Density-dependent regulation is achieved because individuals forgo reproduction in order to help the group survive and maintain an equilibrium population density.

a.) true
b.) false

Complete the following life history schedule to answer questions 10-14.

Age	l_x	m_x	$l_x m_x$	$x l_x m_x$	E_x
0	1.0	0			
1	0.8	0			
2	0.8	0.5			
3	0.4	1			
4	0.2	1			
5	0	-			

10. If the initial number of individuals in the population at age class zero is 1000, how many individuals survive to age class one?

a.) 100
b.) 1.0
c.) 0.8
d.) 800
e.) 200

11. What is the expectation of further life in the fourth age class (E_4)?

a.) 1
b.) 0.2
c.) 0
d.) 1.5
e.) 5

12. What is the net reproductive rate (R_o) of this population?

a.) 0.9
b.) 1.5
c.) 1
d.) 0.1
e.) 100

13. What is the generation time (T) of this population?

a.) 0.2
b.) 7.4
c.) 1
d.) 30
e.) 2.9

14. This population is _____.

a.) increasing
b.) decreasing
c.) stable

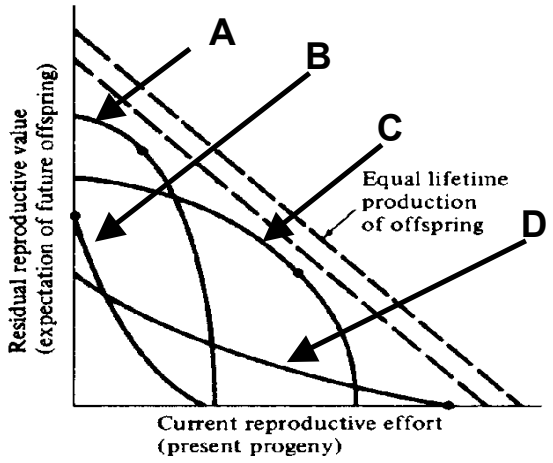
15. Fecundity is designated as _____.

a.) l_x
b.) P_x
c.) m_x
d.) E_x
e.) R_o

16. Population size is neither increasing nor decreasing when r = ____ and R_o = _____.

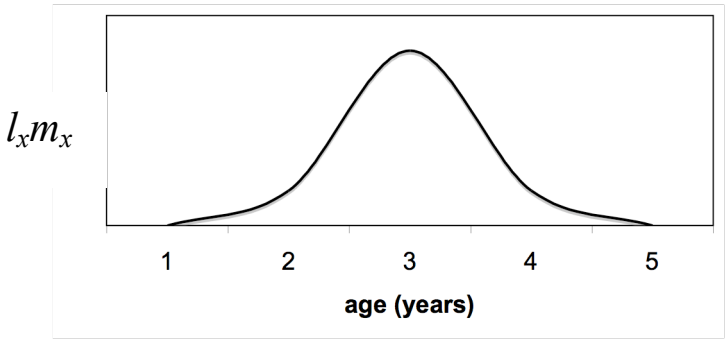
a.) 0; 0
b.) 0; 1
c.) 1; 1
d.) 1; 0
e.) -1; 1

17. Which of the following curves represent semelparous reproducing organisms?



a.) A and D
b.) A and C
c.) B and D
d.) C and D
e.) all of these

Use the following graph to answer questions 18 – 19.



18. Based on this graph, generation time (T) is approximately _____ years.

a.) 1
b.) 3
c.) 5
d.) 10
e.) 0.5

19. The total area underneath the curve represents _____.

a.) net reproductive rate
b.) survivorship of an average individual
c.) total number of individuals in the population
d.) minimum age of any individual
e.) age of first reproduction

20. Which of the following are proximate explanations for latitudinal gradients in avian clutch sizes?

a.) Nest predation hypothesis
b.) Prey diversity hypothesis
c.) Hazards of migration hypothesis
d.) All of these
e.) None of these

21. Instantaneous birth rate minus instantaneous death rate equals _____.

a.) r
b.) l_x
c.) m_x
d.) E_x
e.) P_x

22. As N approaches K, the rate of increase in population growth will _____

a.) remain stable
b.) increase
c.) decrease

23. Which characteristic describes a K-selected species?

a.) small size
b.) produce many offspring
c.) short generation time
d.) stable population densities
e.) type III survivorship curves

24. Detrimental genetic mutations accumulate in post-reproductive years of individuals because _____.

a.) selection acts to eliminate non-reproducing individuals
b.) selection acts to ensure that young individuals receive more resources than old
c.) selection acts to delay detrimental genetic traits past the average age of reproduction
d.) poor healthcare
e.) they are too old and no longer useful

25. The nutrient recovery hypothesis is a(n) _____ explanation of lemming population cycles.

a.) proximate
b.) ultimate

26. The genetic control hypothesis is a(n) _____ explanation of lemming population cycles.

a.) proximate
b.) ultimate

27. A horse is relatively ____ selected compared to a fly.

a.) N
b.) K
c.) r
d.) R_0
e.) T

Use the following table to answer questions 28 – 29.

Age	l_x	m_x
0	1	0
1	0.9	0.2
2	0.7	0.5
3	0.6	1.0
4	0.5	0.3
5	0	0

28. What is the probably of an individual in age class 1 living to age class 3?

a.) 0
b.) 1.0
c.) 0.9
d.) 0.3
e.) 0.67

29. What is fecundity at age class 2 (m_2)?

a.) 0.5
b.) 1.0
c.) 2.0
d.) 0.2
e.) 0.7

30. The structure of the vertebrate eye could be argued to be inferior to that of a cephalopod (squid or octopus) because the optic nerve must pass in front of the retina, causing _____.

a.) an inability to have a closing eyelid
b.) poor underwater vision
c.) a blindspot
d.) an ability to see through the rear of the eyeball
e.) vertebrate eyeballs to burst underwater

31. If two populations of organisms have identical instantaneous growth rates (r) and there is no density – dependent limit to growth, the larger population will add _____ individuals to the population in the next generation.

a.) fewer
b.) more
c.) the same number of

32. If two populations of organisms of the same size (*N*) have identical instantaneous growth rates (*r*) and there are density – dependent limits to growth, the population closer to its carrying capacity will add _____ individuals to the population in the next generation.

a.) fewer
b.) more
c.) the same number of

33. Which of the following is a proximate explanation for male biased sex ratios?

a.) more males are born to account for lower male survivorship
b.) sperm with Y chromosome are smaller and reach eggs faster for fertilization
c.) more men allows women to be choosy and find more fit mates
d.) populations with more men out-compete populations with fewer men
e.) males are stronger and fitter than females

34. An individual that is born male and later becomes female is described by this term.

a.) protandry
b.) protogyny
c.) parthenogenesis
d.) dioecious
e.) diploid

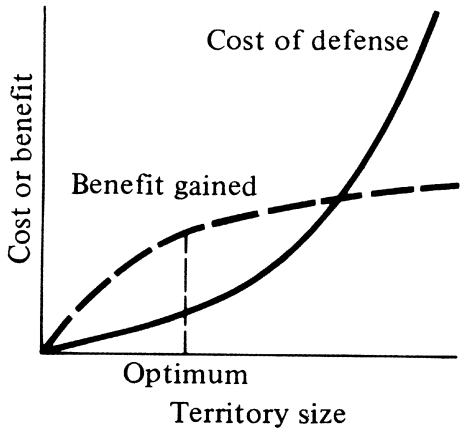
35. The term anisogamy describes:

a.) change in sex during an individual's lifetime
b.) protecting territories to defend resources
c.) regulation of population growth when a population is near carrying capacity
d.) differential size in gametes between sexes
e.) males mating with multiple females

36. Competition between members of the same sex over mating rights is termed:

a.) cuckoldry
b.) intersexual conflict
c.) intrasexual conflict
d.) anisogamy
e.) sexual conflict

37. The following are accurate statements about this graphical model, EXCEPT ___.



a.) cost to defend a territory increases with territory size
b.) *rate* of benefit gained from a territory diminishes with territory size
c.) an optimal territory size is where benefit gained is greatest relative to cost to defend a territory
d.) an optimal territory size is where benefit gained is equal to cost to defend a territory
e.) benefit gained from a territory increases with territory size

38. Humans invented agriculture about _____ years ago.

a.) 1 million
b.) 10 million
c.) 2,000
d.) 10,000
e.) 1,000

39. Bisphenol A is component found in many polycarbonate plastics that mimics _____ molecules and is thought to cause cancers.

a.) carbon monoxide
b.) testosterone
c.) estrogen
d.) nitrogen
e.) carbon dioxide

40. Transfer of energy from one form into another without generating heat is _____.

a.) impossible the greatest benefit of nuclear energy
b.) a component of the Haber-Bosch process
c.) how hybrid cars recharge their batteries
d.) impossible
e.) is how ectotherms maintain their body temperature

41. Population sizes of *r*-selected species are primarily determined by their _____.

a.) carrying capacity
b.) ability to outcompete other species for resources
c.) rate of growth
d.) rate of photosynthesis
e.) ability to cooperate with colony members

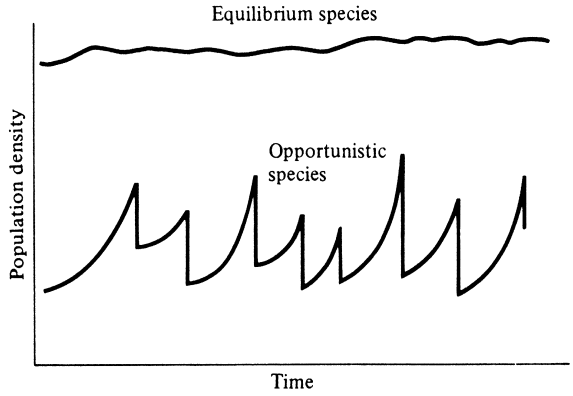
42. A population study where a researcher follows a group of individuals throughout their lives is termed a _____.

a.) lifetime analysis
b.) life history schedule
c.) survivorship schedule
d.) community analysis
e.) cohort analysis

43. Salmon, century plants, and all annual plants have a _____ reproductive strategy.

a.) altricial
b.) precocial
c.) semelparous
d.) stochastic
e.) iteroparous

44. *K*-selected species are more likely to show population variation represented by the line labeled _____.



a.) equilibrium species
b.) opportunistic species

45. Females worker siblings in eusocial hymenoptera insect colonies are more closely related to each other than each is related to its mother because _____.

a.) female workers are haploid and identical clones
b.) the father is haploid and passes all of its genes to its offspring
c.) female workers are produced by asexual reproduction
d.) some worker females are the offspring of other worker females
e.) workers are identical twins

46. The equation ($r\ n\ b > c$) is used to explain _____.

a.) assimilation of food resources
b.) rate of population growth
c.) rate of population growth with density dependence
d.) kin selection or inclusive fitness
e.) the number of lawyers it takes to change a light bulb

47. A sentinel prairie dog that calls out to warn others in its group of an approaching predator is an example of _____.

a.) reciprocal altruism
b.) satellite males
c.) polygamy
d.) territoriality
e.) sensory exploitation

48. An overnight frost that kills half the plants in a population of wild flowers is an example of _____.

a.) polygyny threshold
b.) iteroparity
c.) semelparity
d.) density-independent regulation
e.) density-dependent regulation

49. In a population with unlimited growth at a consistent rate, what does not change?

a.) *N*
b.) *r*
c.) population size
d.) all of these
e.) none of these

50. The Haber-Bosch process _____.

a.) genetically engineers crop plants for a higher yield
b.) provides pest resistance for crop plants
c.) produces clean electricity through nuclear fission
d.) produces ammonia from atmospheric gases
e.) produces energy through photosynthesis