Multiple choice questions.
Pick the single best answer and mark this on your scantron sheet.

1) Which of the following correctly illustrates how biological communities are organized into trophic levels that represent the way that energy flows in the environment:

   a) Decomposers - primary producers - primary consumers - secondary consumers  
   b) Primary producers - decomposers - secondary consumers - primary consumers  
   c) *Primary producers - primary consumers - secondary consumers - decomposers  
   d) Primary consumers - primary producers - secondary consumers - decomposers  
   e) Secondary consumers - decomposers - primary producers - primary consumers

2) Which of the following is not a secondary plant compound:

   a) Lectins  
   b) Alkaloids  
   c) Phenolics  
   d) Cyanogenic glycosides  
   e) *Glucose

3) The fact that many contemporary tropical plants, such as Crescentia alata, have seeds that need large mammals to disperse them is an example of:

   a) High tropical diversity  
   b) Pleistocene megafauna  
   c) A Gomphothere  
   d) *A Pleistocene anachronism  
   e) Plant defenses

4) The discipline of ecological economics integrates the value of biological diversity in economic terms that includes ecology, environmental science and public policy. Traditional economic models are not effective in quantifying environmental issues because

   a) *Environmental costs are often treated as a cost to society rather than to the individual or business, and therefore are treated as externalities or hidden costs or benefits  
   b) Economists’ main goal is to make money at all costs, even though environmental costs are easy to quantify  
   c) Conservation biologists object to a price tag being place on the environment and environmental services  
   d) Environmental costs and benefits are owned by individuals and not by society  
   e) They emphasize long-term benefits over short-term costs.
5) Which of the following traits evolved by ant-acacias is a direct evolutionary response to acacia-ants?

I) Thick tapered thorns with a hard shell and soft core
II) Minimally productive sugar nectarines
III) Development of Beltian bodies
IV) Chemically defended leaves

a) I and II only
b) II and IV only
c) *I and III only
d) II, III and IV only
e) All of the above

6) The eruption of Krakatau in 1883 resulted in the formation of the barren island of Rakata. This afforded scientists the unique opportunity to witness and record the process of colonization as it proceeds on the island. Which of the following was NOT a method of arrival for new plants and animals?

a) Airborne transport (arrival of Aeolian plankton and Aeolian debris)
b) Rafting by organisms
c) Organism powered flight
d) Hitchhiking on other organisms
e) *Human planned introductions to restore the forest

7) Which of the following statements best categorizes the relationship among information, science and society:

a) *Science attempts to describe the real world and freely gives away information whereas society survives by selectively withholding information
b) The purpose of science is to describe information that can be readily used by society
c) Society selectively directs the research of scientists and maintains control of all information collected
d) Science attempts to describe the real world and selectively distributes information whereas society freely seeks to share information
e) Science and society are in very strong harmony and both attempt to describe the real world and freely disseminate information
8) Rather than implementing minor changes in the economic systems such as those reflected in ecological economics, an alternative approach to protecting biological diversity and improving the human situation would be to:

a) Increase the consumption of resources in developing nations
b) Spend more on guarding natural resources
c) *Lower the consumption of resources in developed nations
d) Salting the oceans with iron oxide to increase marine carbon fixation
e) All of the above

9) If an anthropologist digs up a village in the African Rainforest 2,000 years from now, how is the dietary evidence that she/he finds biased?

a) It is not biased: remnant animal bones found will accurately reflect the dietary composition in wild-caught meat for the villagers
b) *The evidence found will only represent animals that were brought back entire to the village and consumed, and only animals with very hard skeletal structures will remain
c) The villagers sell the majority of their catch at markets
d) Villagers consume mainly fruits and vegetables
e) None of the above

10) Evidence of within-plant differential response by ant-acacias to browsing is illustrated by:

a) The fact that camels have a dense horny plate on the roof of their mouths and a hard disc located on their tongue which they use to crush acacia thorns
b) Goats are able to effectively browse acacias because their small mouths fit between most thorns
c) When acacia plants are browsed by mammals they respond by producing chemically laden leaves
d) The fact that big browsing mammals don’t like thorns and therefore don’t browse on acacias
e) *The fact that when acacia plants are browsed they respond by producing a greater quantity of more densely packed thorns on the branch that has been browsed than on other branches

11) Many of the world’s ancient megafaunal extinctions in the past are due to:

a) *Hunting behavior of humans at the time they arrived on that land mass
b) Meteors colliding with earth
c) Movement of the continents
d) The dramatic changes in the earth’s climate
e) Destruction of habitat
12) Tapeworm immatures have the tendency to affect the physical and/or mental abilities of their hosts. Why is this?

   a) To kill their host before moving on to their next host
   b) *To facilitate that their host is consumed by a carnivore
   c) To keep their host stationary so other tapeworms can find it
   d) Any parasite within the body will influence physical and mental abilities of the host
   e) All of the above

13) Ethical arguments for preserving biological diversity contrast with economic arguments because:

   a) They emphasize that preserving biodiversity is in our material self interest
   b) *Preserving biodiversity is based on intrinsic values of wild nature and we should act altruistically toward nature
   c) Biodiversity is useful to us for economic advancement
   d) Biodiversity has values in the services it provides and the products it produces
   e) All of the above

14) Which of the following is a plant defense that cannot be overcome by a plant parasite, herbivore, or seed predator?

   a) Secondary chemical compounds
   b) Spines, hairs and thorns
   c) Sticky saps and resins
   d) Thick hard cell walls
   e) *None of the above

15) Biological diversity is:

   a) The entire range of living species
   b) The genetic variation that occurs among individuals within a species
   c) The biological communities of species
   d) The environments where the species live and interact
   e) *All of the above

16) The age and health of street and park trees in a city provide information on:

   a) The historical record of native species diversity in the city
   b) *The socio-economic histories of neighborhoods of the city
   c) The education level of a neighborhood
   d) Absolutely nothing about the city
   e) The cost of tropical hardwood timber
17) Which of the following statements best summarizes the relationship among pigs, rats, chicken and famine in Asian human history:

a) During times of famine there were no pigs, rats, or chickens
b) *High densities of rats, chickens and pigs were present in times of famine because their densities in the wild increased as a result of feeding on synchronously produced bamboo seeds
c) Pigs, rats and chickens were kept at artificially high densities as a result of human domestication of the animals and were consumed almost to extinction during times of famine
d) Chickens, pigs and rats travel in multi-specific migratory herds exploiting resources, often leaving famine in their wake
e) None of the above

18) Many island archipelagos offer evolutionary biologists the ideal setting to study adaptive radiation, why is this?

a) Island archipelagos, such as the Hawaiian islands, are prime examples of places where low species diversity exists and is comprised of a relatively small number of generalists
b) Islands, unlike continents, do not offer a variety of niches for new species to evolve and exploit
c) *Species arrive in a new and mostly empty world where, initially at least, opportunity to spread is before them throughout the archipelagos
d) Archipelagos are often sterile and barren
e) b and d

19) One of the main by-products of forestry in Costa Rica that has severe environmental impacts is:

a) *The use of logging roads as the migratory infrastructure for an advancing wave of human colonizers
b) The higher economic benefits provided by clear cut logging
c) The implementation of ecological labeling of products for sale in the United States
d) The maintenance of socioeconomic stratification as a result of only a few people having control over land
e) The development of plantation forestry stands
20) Despite their historical proximity why did lions and tigers fail to hybridize even though their hybrids have successfully been bred in captive situations?

a) They live in different habitats
b) They have different behaviors for selecting mates
c) Their historical ranges currently do not overlap
d) *a and b only
e) Ligers are neither social nor solitary predators

21) Which of the following is true of organisms that feed using generalist strategies such as the caterpillars of Saturniidae moths:

a) They feed on a small number of closely related plants
b) They generally posses the ability to detoxify and a consume a large variety of plant species
c) *They feed on a large number of plant species and consume a large quantity of plant material to meet their nutritional requirements
d) They thoroughly digest all plant material they ingest
e) They have a variety of plant detoxifying strategies

22) Which of the following occurred in the Cambrian period (the earliest of the time segments of the eon in which we now live):

a) *An explosive increase in size and diversity of animals
b) A mass extinction of gigantic proportions
c) The origin of life spontaneously from prebiotic organisms
d) The origin of the human mind
e) None of the above

23) The relationship between ant-acacias and acacia-ants is defined as coevolved because:

a) Ants actively patrol ant-acacias and remove foreign objects
b) Ant-acacias have modified thick shelled, soft core thorns and produce large amounts of sugar for ant consumption
c) Ant-acacias have long thorns that protect both the ant-acacias and ants from herbivores
d) Ants actively patrol the surface of the plant and prey on herbivores that they find
e) *Both the ant-acacias and the acacia-ants have evolved traits in response to each other’s traits
24) How many major mass extinctions of the earth’s organisms do Paleontologists currently recognize?
   a) 0  
   b) *5  
   c) 65  
   d) 500  
   e) 6500

25) The monthly catch of hunters in the African rain forest is most limited by:
   a) Their ability to successfully catch animals in their snares  
   b) Their limited ability to travel from town due to price and supply of gasoline  
   c) The adaptive behavior of prey to learn and avoid snares once they have been caught in them  
   d) Their ability to transport and store meat from the field back to the city  
   e) *The rapid rate of decomposition and scavenging by flies that feed on dead mammals and birds

26) E. O. Wilson describes the ferocity of a tropical rainstorm as walls of rain fall upon the forest, but that the next morning the forest around the village of Fazenda Dimona had not changed in any obvious way from the day before. What is the key to the forest’s resilience?
   a) *Biodiversity  
   b) Good management by humans  
   c) Low frequency of storm occurrence  
   d) Composition of low diversity of very hardy species of plants and animals  
   e) All of the above

27) The main cause of the current rarity of Crescentia alata trees in Central America today is that:
   a) The diet of horses is supplemented to such an extent that they are no longer feeding on Crescentia fruits  
   b) *The motorcycle is replacing the horse as the preferred mode of transportation  
   c) Crescentia fruits are being harvested for human consumption  
   d) The fruits are not producing viable seeds  
   e) The airplane is replacing the motorcycle as a preferred mode of transportation
28) Which of the following is NOT an example of a coevolved trait between Pseudomyrmex ants and ant-acacias?

a) A greatly increased production of sugar by the nectaries on the leaves
b) The hollowing out of enlarged thorns by ants
c) The development of Beltian bodies
*d) Clearing of ground-level foliage by ants to protect the ant-acacia from fire
e) The patrolling of ant-acacias by Pseudomyrmex ants

29) Semelparous species are:

a) Those with individuals that reproduce repeatedly during their lifetimes
b) Those with individuals that reproduce synchronously
c) Those with individuals that reproduce asynchronously
d) Those with individuals that migrate and reproduce in a specific locale
e) *Those with individuals that reproduce only once in their lifetime

30) The key to the high level of sustainability achieved by the African Timber and Plywood Company was reflected in their procedures. Which of the following was key to their success?

I. Control over a large area of forest (over 400 square miles)
II. A centralized government office that managed the region and determined the species, ages, etc. of trees to be cut
III. 50 year cycle of harvesting
IV. Use of already felled trees - the harvest of trees that had fallen due to age, storms, disease, etc.

a) I and II only
b) I, II, IV only
c) IV only
d) *I, II, III only
e) All of the above

31) The use of an urban-rural gradient in urban ecological studies:

a) Can delineate issues of environmental justice in socio-economically stratified areas
b) Is most effective when there is a corresponding change in altitudinal gradient
c) *Can serve as a substitute for a time gradient in ecological studies
d) Is to measure the ecological footprint of a city
e) Should be designed to follow natural forms such as watercourses
32) Thomas Belt, the man for whom Beltian bodies are named, was:

a) A renowned Harvard scientist who said “Acacias need ants like a dog needs fleas”
b) An armchair biologist and central figure in the debate over the relationship between ants and acacias
c) *A mining engineer who was the first to publish a description of ant-acacias, their resident ants, and their probable mutualism
d) A graduate student at UC Davis who described the coevolutionary relationship between Pseudomyrmex ants and ant-acacias
e) A graduate student from the UPenn who studied birds who nested in acacias

33) Which of the following statements about plant’s secondary chemical compounds is true:

a) *Plants contain numerous secondary compounds heterogeneously distributed throughout the plant and which help defend it from a variety of herbivores
b) Plants typically have only one secondary chemical defensive compound distributed homogeneously throughout the plant
c) Secondary compounds are chemicals that are produced by the plant as waste from the primary and omnipresent pathways of plant biochemistry
d) Secondary compounds are concentrated in the waste areas of the plant that are seasonally purged from the main structure of the plant
e) Secondary compounds do not affect humans, which explains why we are able to consume many fruits and vegetables without ill effects

34) Which of the following is true of the relationship between Costa Rican forestry practice and the African Timber and Plywood Company’s practices?

a) Neither method of logging is ecologically sustainable
b) Both methods result in the release of equivalently large volumes of carbon dioxide into the atmosphere
c) *In the current economic market, more money can be made per year per area by mimicking Costa Rican forestry practices
d) Costa Rican foresters use methods perfected by the African Timber and Plywood Company
e) Both methods of logging have dramatic and long lasting effects on the native forests
35) Which of the following best characterizes the different tactics used by plants to defend themselves with secondary compounds:

a) *Maintaining a standing army and having also an army of reserves that can be mobilized at a moments notice
b) Maintaining an army of policeman and an army of hunters
c) Equally depending on behavioral defenses and chemical defenses
d) Harvesting compounds from other sources rather than producing them themselves
e) None of the above

36) Many organisms illustrate a latitudinal gradient in species richness, with more species existing in the tropics than in the temperate zones. Why is this?

I) Tropical communities are more stable than temperate communities
II) Warm temperatures and high humidity in tropical areas provide favorable conditions for growth and survival of species
III) Tropical species may face greater pressure from parasites and disease, which prevents any species from dominating communities
IV) Tropical regions receive more solar energy over the course of a year than temperate regions
V) The geologic formation of tropical regions is characteristically uniform

a) I, II, III only
b) I, IV, V only
c) I, II, III, V only
d) *I, II, III, IV only
e) All of the above

37) Which of the following are forces that increase biodiversity?

a) Predators
b) Commensalisms
c) Mutualisms
d) Character displacement
e) *All of the above

38) The heartwood of a tree is characteristically hard because:

a) It is the dead matter of a tree and fossilizes as the tree ages
b) It feeds on the nutrient rich soil found in the center of the tree and is able to grow stronger because it has more nutrients than the outer softer wood
c) *As the tree grows, secondary compounds are deposited in it which preserve it from fungal and insect attack
d) It contains ducts which secret gum or resin when disturbed
e) It is the outer layer of the tree which both supports the tree’s physical structure and helps protect the tree from attack due to its durability
39) The fundamental evolutionary event is a change in:
   a) Species
   b) Communities
   c) Individuals
   d) *Genes
   e) Ecosystems

40) Which of the following changes the number of years that a bamboo clone waits to flower and fruit?
   a) Exposing the plants to fire
   b) *Varying the lengths of exposure to long and short day cycles
   c) Varying the amounts of fertilizers applied
   d) Varying the harvest frequency of bamboo poles
   e) Removing part of the clone and planting it in another locale

41) Cities are important ecosystems to study because:
   I) The majority of the world’s population live in cities
   II) They are biological wastelands
   III) The nature of urban systems shapes people’s attitudes about nature as well as the urban circumstance
   IV) They represent highly undisturbed habitat
   a) I, II only
   b) I, IV only
   c) II, III only
   d) *I, III only
   e) II, III, IV only