1. If you want to compare the means of weights in two groups of sizes 7 and 8, respectively, then the degree of freedom of the t-test is
    a. 15
    b. 14
    c. 13
    d. None of the above

2. The prevalence of a disease in a population is 10%. If 3 individuals are selected at random, what is the probability that one of them is affected?
    a. 0.1
    b. 0.3
    c. 0.81
    d. 0.243

3. It is suspected that a novel protein only interacts with the promoter region of a gene. Which of the following techniques are suitable to confirm this suspicion?
    a. EMSA and DNase footprinting but not ChIP.
    b. DNase footprinting and ChIP but not EMSA.
    c. EMSA and ChIP but not DNAse footprinitng.
    d. EMSA, ChIP and DNAse footprinting.

4. If a polymerase chain reaction (PCR) amplification was performed on human genomic DNA, multiple products of varying sizes were obtained, including one of the expected size. Which of the following modifications to the protocol is the most likely to eliminate the extra PCR productc?
    a. Raising the annealing temperature.
    b. Raising the denaturation temperature.
    c. Raising the elongation temperature.
    d. Increasing the elongation time.

5. Which of the following actions best explains how a minor change in transcription factor levels could lead to a big change in transcriptional output of it's target gene?
    a. Chromatin modification.
    b. Cooeprative binding.
    c. Dimerization.
    d. Negative feedback.

6. Which of the following provides key evidence that snRNPs are involved in the splicing of pre-mRNA?
    a. Association of snRNPs within ribosomes.
    b. Base-pairing between snRNAs and pre-mRNA splice sites.
    c. Introns within snRNAs.
    d. Lariat structure within snRNAs.

7. What do T-cells need to recognize so that they can respond to specific antigens?
    a. The antigenic epitope displayed by MHC molecules.
    b. B cells.
    c. Immunoglobulin.
    d. Cytokines.

8. Induced Treg cells maintain, in part tolerance to
   a. insulin.
   b. growth hormone
   c. peanuts
   d. none of the above.

9. If the DNA from a bacteriophage has base composition of 20% A, 30% T, 20% G and 30% C, then
   a. the DNA of the bacteriophage is linear and can tolerate base-pair mismatch.
   b. the genome of bacteriophage is single-stranded DNA.
   c. in viral genomes, the base pairing does not follow the standard Watson-Crick rules and allows G-T and C-A base pairings.
   d. the DNA of bacteriophage tightly binds with special proteins which inhibit standard Watson-Crick base-pairing.

10. The greatest buffering capacity at physiologic pH would be provided by a protein, rich in which of the following amino acids
   a. Lysine
   b. Aspartic acid
   c. Valine
   d. Histidine

11. Which cellular processes produce the carbon dioxide that is exhaled?
   a. Glycolysis but not citric acid cycle.
   b. Citric acid cycle but not glycolysis.
   c. Both glycolysis and citric acid cycle.
   d. Neither Citric acid cycle nor glycolysis.

12. Absorbance of 0.02mM ATP solution at 260nm with a cuvette having a path length of 0.5cm is 0.154. The molar absorption coefficient [in L mol^{-1} cm^{-1}] of ATP is
   a. 7700
   b. 1540
   c. 770
   d. 15400

13. If a patient is deficient in pyruvate kinase, how many net moles of ATP would be generated upon conversion of 1 mole of glucose to pyruvate?
   a. 0
   b. 1
   c. 2
   d. 3

14. Which of the following enzymes is involved in nucleic acid synthesis without requiring any template DNA?
   a. DNA polymerase I
   b. DNA polymerase II
   c. Poly (A) polymerase
   d. RNA polymerase

15. Telomerase is composed of
   a. protein and RNA.
   b. only protein.
   c. only RNA.
   d. protein and DNA.