BIO 1 EXAM 3 ESSAY QUESTIONS: Four of these essay questions will be on the exam and you will choose to write on three out of the four. Each of the three questions will be worth 10 exam points.

1. Describe A) what an organism’s genome is, B) what chromosomes are, C) what sister chromatids are, D) what homologous chromosomes are and E) how each of us obtains our homologous chromosomes.

2. A) Describe what occurs during interphase of the cell cycle.  
   B) Name the four steps of mitosis and briefly describe what happens in each step.

3. A) Define the following: 1) Carcinoma; 2) Sarcoma; 3) Leukemia; 4) Lymphoma and myeloma  
   B) State two cancer treatments that we discussed and briefly describe how they work.  
   C) State two strategies that can reduce the risk of cancer.

4. A) State whether oogonia and spermatogonia are haploid or diploid.  
   B) State why spermatogonia are considered stem cells and how long males can keep producing sperm.  
   C) State when eggs are produced in large numbers in females and if the statement that adult females have reproductive stem cells like males has been completely accepted in the science community.  
   D) Explain when Meiosis I starts and ends and when Meiosis II starts and ends in females.

5. A) Describe the three reasons that we discussed explaining why meiosis is important.  
   B) One way that meiosis can go wrong is by nondisjunction. Describe what nondisjunction is and describe the two conditions that are caused by nondisjunction.

6. A) State what “PGD” stands for and briefly describe how this process is done.  
   B) State who can benefit from PGD.  
   C) State two ethical issues/concerns surrounding PGD.

7. Compare and contrast the two types of cell division, mitosis and meiosis, by A) stating what type of cells each cell division type produces, B) stating if the cells before each type of cell division are haploid or diploid C) stating if the cells after each type of cell division are haploid or diploid and by D) describing the condition that occurs when each type of division malfunctions or goes wrong.

8. A) Define the two types of reproduction: sexual and asexual.  
   B) State one advantage and one disadvantage that organisms that use each type of reproduction would experience.  
   C) Give an example of an organism that uses each type.

9. A) Define what a transgenic organism is.  
   B) Describe two specific ways in which we are using transgenic biotechnology.  
   C) Describe two specific concerns surrounding genetically modified foods discussed by the articles that you read.  
   D) Describe two specific benefits of genetically modified foods discussed by the articles that you read.  
   E) According to the latest research, are genetically modified foods considered safe?

10. A) Name the two types of cloning that we discussed and the goal of each type.  
     B) Name and describe the two types of stem cells that we discussed.  
     C) Describe one advantage and one disadvantage of stem cell research.

MORE QUESTIONS ON THE BACK OF THIS SHEET
11. Use the information that you learned from the videos “Stem Cells Breakthrough”, “Anthony Atala on growing new organs” and “Replacing Body Parts” to answer the following:
   A) State why embryonic stem cells are also called pluripotent cells.
   B) Describe what happens to our genes during embryonic development which produces different cell types.
   C) Briefly describe the method used on donor organs, like the liver, to engineer them for patient use.
   D) State two benefits of using scaffold based organ technology over conventionally used organ donation methods.

12. Read the online article “Whose Blood Is It, Anyway?”. Describe two advantages and two disadvantages of using umbilical cord stem cells instead of bone marrow transplants for treating people with immune system and enzyme deficiencies, sickle cell anemia, leukemia, and other cancers.

13. A. Define what DNA fingerprinting is.
   B. Describe the DNA fingerprinting techniques by briefly describing the following steps in DNA fingerprinting:
      1. Polymerase Chain Reaction (PCR)
      2. Restriction Enzymes
      3. Gel Electrophoresis

14. Genetically speaking, what is an organism’s genotype and phenotype? Also, describe what it means when an organism is homozygous or heterozygous for a given trait.

15. Describe the two laws that Mendel came up with: 1) the Law of Segregation and 2) the Law of Independent Assortment. Also state which type of cell division, mitosis or meiosis, these laws occur in.

16. Describe the following inheritance patterns and state an example for each: 1) autosomal recessive, 2) autosomal dominant, 3) incomplete dominance 4) multiple alleles, 5) codominance, 6) polygenic, and 7) sex linked.

17. Use the information that you learned from the online video “Epigenetics” to answer the following:
   A) What does our epigenome “tell” our cells to do?
   B) Describe what epigenetic therapy is and how it works and state what illness it is being used to treat.
   C) Can we negatively alter our epigenomes and our children’s epigenomes? How so?