Module 08: Cell Division — Mitosis & Meiosis — Study Questions

1. What are the main stages of the cell cycle, and what happens during each?
2. Why is it important for a cell to replicate its DNA before dividing?
3. What is the difference between chromatin and a chromosome?
4. After DNA replication, what are the two identical copies of a chromosome called, and what holds them together?
5. What is the difference between homologous chromosomes and sister chromatids?
6. List the four stages of mitosis in order and briefly describe what happens in each.
7. What is the role of the mitotic spindle during cell division?
8. How does cytokinesis differ between animal cells and plant cells?
9. What is the result of mitosis and cytokinesis — how many cells are produced, and are they diploid or haploid?
10. Why is mitosis important for a multicellular organism?
11. What is the purpose of meiosis, and where does it occur in the human body?
12. How many rounds of division occur in meiosis, and how many cells are produced at the end?
13. What happens during prophase I that does NOT happen during prophase of mitosis?
14. What is crossing over, and how does it contribute to genetic variation?
15. Explain independent assortment. During which stage of meiosis does it occur?

16. What separates during anaphase I? How does this differ from what separates during anaphase II?

17. Create a comparison: list at least four differences between mitosis and meiosis (purpose, number of divisions, number of resulting cells, ploidy of resulting cells).

18. What is nondisjunction? Describe one condition that can result from it.

19. How do crossing over, independent assortment, and random fertilization work together to produce genetically unique offspring?

20. A cell has a diploid number of 8 ($2n = 8$). How many chromosomes would be in each cell after mitosis? After meiosis?