Problem 0 (4 points)

Choose the correct answer for the following multiple-choice questions:

0.0) You are offered old homework solutions by a student who formerly took this class. You should:
   a. Accept the solutions because no one will ever know.
   b. Not even look at the solutions because that is the honor code set for this class.
   c. Accept the solutions because you don’t really want to learn anything in this class. You are simply taking it to fulfill a requirement.

0.1) While working with a partner on a homework assignment, one of your classmates asks if he/she can also work with you. You should:
   a. Tell the other student that you already have a partner for this homework assignment.
   b. Agree to work with the other student, but only on the portion of the homework you have not yet completed.
   c. Apologize for having found a partner too early and offer to send the other student a completed copy of your homework.

0.2) Suppose you and your partner are overwhelmed with work at the time the homework is due. You should:
a. Have your partner do half the problems, you do the other half, and combine your solutions.

b. Complain about your course load to everyone you meet.

c. Think ahead and email Professor Adve for an extension within 48 hours of when the homework is handed out.

0.3) You and your partner have discussed all the problems and their solutions. You then independently finish writing up your solutions for submission. Your partner texts you that s/he is running out of time to write up her/his solutions because there is a midterm the next day and asks you for your writeup as an aid. You should:

a. Give your partner your writeup. After all, you already discussed the solutions with her/him earlier.

b. Not give your writeup because the honor code requires both partners to independently write the solutions.

c. Not give your writeup, but be available to help your partner as she/he writes up her/his submission.

Problem 1 [3 points]:

Suppose we apply an enhancement, E1, that speeds up 10% of a program by a factor of 4. We also apply another enhancement, E2, that speeds up another 20% of the program by a factor of 12. Assume the two enhancements are independent and affect different parts of the program (there is no overlap between the 10% and 20% of the program). What is the overall speed up for the entire program using both E1 and E2 simultaneously?

Problem 2 (3 points)

Consider a 2.4 cm² die for a 64-bit processor manufactured from a 30cm-diameter wafer costing $9,000. Assume a wafer yield of 99%. Use the defect model from the lecture notes with 0.04 defects per cm² and $\alpha=14.5$. What is the expected cost per die (before testing)? Ignore edge effect correction.

Problem 3 (2 points)

Suppose a processor uses 77W of power while operating at 3.15 GHz, of which 4/5 is dynamic power. Suppose we want to run the same processor at a higher frequency which requires increasing the operating voltage proportionally as well. If the processor speed is increased by 15%, what is the new dynamic power consumption?

Problem 4 (3 points)

Consider a server farm of 1,500 identical components where a single failure causes the entire system to crash. If each component has an MTTF of 125 days, what is the MTTF of the entire farm? Assume an exponential distribution for component time to failure.