

CS 25000 Homework 01 – upload by 11:00pm Wednesday, Sep. 03, 2025 Purdue Local time.  
This assignment is due 11:00pm Friday, Sep. 05 for students enrolled in CS250 after Aug. 29.

**Instructions on how to process the Word file for each homework assignment.**

- Download this file.
- Delete nothing from this Word file.
- Edit this file to add your typewritten answers to each question.
- Ensure that your answer fits on the same page as its question. If you change the pagination of this file or if your complete answer to a question does not fit on the page with that question, then you may receive a lower score.
- When your answer includes a hand-drawn diagram make it clear, large, and legible.
- Export your completed Word file to PDF.
- Upload your PDF file to its corresponding assignment portal in Gradescope.com. You may upload multiple times. Your final upload will be scored. As desired, use the download capability to check your upload.
- Uploading will be blocked after the due time plus the 59 minute grace period.
- Max score = 20 points; equal weight per question.
- The above instructions apply for all assignments uploaded to Gradescope.

- **Why should your answer be on the same page with its question?**

Answer: Gradescope has been programmed to expect that your PDF file will have exactly 10 pages, each containing a question and your entire answer. This allows Gradescope to automatically display each answer for scoring.

HW01 Q1. I am comfortable with programming in C. Keep it simple, answer either Yes or

Not yet.

Yes.

HW01 Q2. I am comfortable using any of the nano, VI or Vim editors. Answer Yes, and name that editor(s) or answer Not yet.

Yes, nano and Vim.

HW01 Q3. I have used the GDB debugger in a class at Purdue. Yes/Not yet.

Not yet.

HW01 Q4. What is it that you hope CS 25000 will contribute to your success professionally?

I love Java and C, I know the knowledge that I will learn in this class match with all of my skill to improve and achieve the job that I want in the future.

HW01 Q5. Describe your experience with Lab 01.

It was very good, the document was clear and easy to understand, also the two people who were there were very helpful and working with a partner helped me better understand and practice the knowledge we had learned in class.

HW01 Q6. Describe your experience with our zyBook.

It is very easy to understand and use, the friendly teaching style is excellent.

HW01 Q7. Aside from the smartphones used by billions of people, list and describe four other types of computers.

Intelligent freezer, tablets, smartwatches and smart TV.

HW01 Q8. The eight great ideas in computer architecture are similar to ideas in other fields. Match the eight ideas from computer architecture, "Design for Moore's Law," "Use Abstraction to Simplify Design," "Make the Common Case fast," "Performance via Parallelism," "Performance via Pipelining," "Performance via Prediction," "Hierarchy of Memories," and "Dependability via Redundancy" to the following ideas from other fields:

- A. Assembly lines in automobile manufacturing
- B. Suspension bridge cables
- C. Aircraft and marine navigation systems that incorporate wind information
- D. Express elevators in buildings
- E. Library reserve desk
- F. Increasing the gate area on a CMOS transistor to decrease its switching time
- G. Adding electromagnetic aircraft catapults (which are electrically powered as opposed to current steam-powered models), allowed by the increased power generation offered by the new reactor technology
- H. Building self-driving cars whose control systems partially rely on existing sensor systems already installed into the base vehicle, such as lane departure systems and smart cruise control systems

Use the labeled lines below to connect your answers to the 7 other field ideas above.

- A. Performance via Parallelism
- B. Dependability via Redundancy
- C. Performance via Prediction
- D. Make the Common Case Fast
- E. Hierarchy of Memories
- F. Performance via Pipelining
- G. Design for Moore's Law
- H. Use Abstraction to Simplify Design



HW01 Q9. Prove that there are  $2^n$  entries in a truth table for a function with  $n$  inputs. Hint: Develop a proof centered on a combinatorial counting argument using the Rule of Product from CS 182000.

A Boolean function with  $n$  inputs has each input of taking 2 values, 1 or 0, So:

$$2 \times 2 \times \dots \times 2 = 2^n$$

The truth table for a function with  $n$  inputs has exactly  $2^n$  entries.

HW01 Q10. One logic function that is used for a variety of purposes (including within binary adders and to compute bit string parity) is *exclusive OR*, abbreviated *XOR*. The output of a two-input XOR function is true only if exactly one of the inputs is true. Show the truth table for a two-input exclusive OR function with inputs named A and B. Then draw a neat circuit diagram showing a Product of Sums implementation of XOR using only AND gates, OR gates, and inverters. Inputs A and B enter the circuit from the left and the output A XOR B exits the circuit on the right, i.e., the flow of data through the computation is from left to right.

A	B	A XOR B
0	0	0
0	1	1
1	0	1
1	1	0

$$A \text{ XOR } B = (A + B) \times (\underline{A} + \underline{B})$$

