

IST-ASM Final Exam — Fall 2025

Name:

- First, write your name in the box above. Then, have a quick read through all 8 questions.
- In the end, you will write up your answers on this paper.
 - But please make a draft elsewhere first. Only hand in something readable. Really.
- This is an open-book open-laptop exam: you may work on scrap paper and/or on your screen.
- Each question is independent from others, except stated otherwise.

Question 1 Perform the addition $0x9E + 0x52$ where both numbers are positive integers. In the boxes below, convert both numbers to binary, compute the sum in binary, then convert the final result back to hexadecimal. Show the details of your work.

0x9E as binary:

0x52 as binary:

addition:

Question 2 Convert binary values below from two's complement on eight bits to decimal notation. Show the details of your work.

11011110

01101101

Question 3 What is the ASCII encoding of 2025-10-23 (ten characters) ? Write each byte as a hexadecimal number (i.e. "42" will be read as 0x42, not "decimal 42").

Question 4 For each color below, give the corresponding hex triplet.

yellow	
purple	
orange	
cyan	

Question 5 Convert the program below to ASM syntax:

machine code (hex)

00 20b0029a

04 29bb0001

08 320bffffc

$\longleftrightarrow$

source code

Question 6 The program below implements a certain mathematical function f : given two integers A and B (both assumed to be strictly positive) it calculates $C = f(A, B)$. Give a simple expression for f .

$f(A, B) =$

```

A:    .word ...
B:    .word ...
C:    .word ...
main: load R1, [A]
      load R2, [B]
      leti R3, 1
loop: mul R3, R1, R3
      dec R2
      bgtz R2, loop
      store [C], R3
      halt

```

Question 7 Write a program which takes a positive number X in R1 as input and computes result Y in R2 such that the decimal notation of Y is the same as X but with all even digits (0, 2, 4, 6, 8) removed. If all the digits of X are even, then Y should be zero. The table below gives a few examples ; don't hesitate to ask for clarifications if needed.

X	37	69621	42	2025	123456789
Y	37	91	0	5	13579

Question 8 Write a program that draws two “diagonal” straight lines across the screen in a pure green color. Like illustrated on the right, your lines should connect pixels from opposite corners. However, as long as your lines are sufficiently “straight” (to within one pixel), you are not required to match the exact same pixels as in our picture.

