**CSE 410/510 Software Security, Spring 2022**

**Instructor: Ziming Zhao  
Homework – 9**

[8 points] Task 1: Develop a program to calculate the minimum number of an array of integers. Your program should have a function with variable arguments, whose prototype is min(int num, …). num is the number of inputs. Attach your source code here, and take screenshots of its outputs. You do not have to use our server for this task.

[7 points] Task 2: Use printf and a corresponding format string to print out the following data in the correct format. Show your source code. Take screenshots of the output. 1) print out the number 56798 in decimal with width of 10 preceding with zeros; 2) print out the address of the function printf in hex with width of 8; 3) Use five different format strings with ‘%n’ to store how many charterers have printed out to a local variable, print out the value. You do not have to use our server for this task.

[5 points] Task 3: Crash the program formats1\_32 using the format string vulnerability. Take screenshots.

[5 points] Task 4: Read the two strings of secrets in the program formats2\_32 using the format string vulnerability. Take screenshots, which should clearly show your exploit.

[10 points] Task 5: Exploit formats3\_32 and capture the flag. Briefly explain how your exploit works. Take screenshots.

[10 points] Task 6: Exploit the format string vulnerability in formats5\_32 to overwrite the variable auth and capture the flag. Briefly explain how your exploit works. Take screenshots.