System Programming and Machine Language Midterm Spring 2019

1) Write an assembly program to divide 10 bytes by 5 bytes and store the result (quotient and remainder). Use the algorithm explained in the class.

2) Write an assembly code by access the keyboard buffer directly and inject the word “Hello” to the buffer. You need to disable int 9, put the characters in the buffer and modify the head and tail.

3) Write assembly codes as follow:

a) Get two strings from user by using int 21h. Then by using string instruction “cmps” compare these two strings. Use int 21h to prompt user whether these two strings are equal or not.

b) Write the same program this time by using scanf, printf, and strcmp functions from c inside your assembly code. Explain how you use c library to make the exe file.

4) Write a assembly procedure to mimic the C function int fun (int a , int b) which calculates a*7+b*3.

a) Write a c main to use this function. Explain that how you can compile both files separately and the then link them. Also explain (include the instructions you need to do) that how you can add your fun procedure to a library.

b) Write an assembly code to call your procedure. Explain that how you can assemble both codes and link them together to create an exe file. How you can use the library you made in previous step to make your exe file now?

5) Write a Macro “display message, n” to generate the assembly code to display the given “message” on the screen n times. Note that you also need to generate the code for variable definition (local text db “message”,$) and using REP in your macro. Write a sample code that how you can use this macro. How you can add this macro to a macro library and explain that how you can use this macro library in your code.

6) By using stosw instruction and direct access to the text video buffer write an assembly code to fill the screen with a blinking green ‘+’ in white background.

7) Write an assembly code with direct video buffer access in CGA mode and draw a line from (X1,Y1) to (X2,Y2) defined as DB or DW in your program.

8) Any character which is displayed on the text mode from any software and including int 21h is using BIOS int 10h service 09h or 0Ah. You need to change int 10h with your own code (by using TSR concept). So x is displayed on screen regardless of the character that user presses. Then in any software in your DOS, anything that the user types, he only can see x on the screen and not the typed character. You need to check AH in your code and if AH=09 or 0A then change AL (the ASCII code of the character with ‘x’ and then call the old int 10.

9) Write the same program as 8 but this time change int 9h, the hardware interrupt for keyboard. This time you need to call old int 9 and then go to the buffer and change the character in tail position with ‘x’. Both programs work the same but explain the differences between them.