本試題共 9 題，每題得分如各題中所示，共計 100 分，請依題號作答並將答案寫在答案卷上，違者不予計分。

1. (10pt.) Convert the following hexadecimal representations of 2's complement binary numbers to decimal number.

(a) xF0

(b) xF77

(c) x16

(d) x8000

(e) x1

2. (10pt.) Convert these decimal numbers to 8-bit 2's complement binary numbers.

(a) 102

(b) 64

(c) 33

(d) -128

(e) 127

3. (20pt.) Implement a 4-to-1 mux using only 2-to-1 muxes making sure to properly connected all of the terminals. Remember that you will have 4 inputs, 2 control signals, and 1 output. Write out the truth table for this circuit.

4. (10pt.) A symbol of 2-to-1 mux is listed below. Please draw the gate-level circuit of 2-to-1 mux.
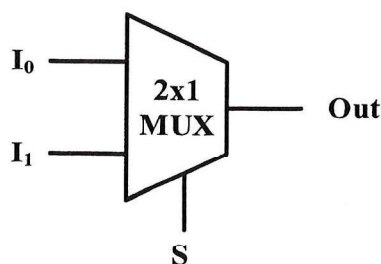
5. (10pt.) Assume that the scheduling of a processor is shown in the following table. There are three procedures to be done. The scheme of the shortest job first (SJF) for procedure arrangements is adopted. The procedure P1 first arrives, and then the procedure P2. Finally, the procedure P3 arrives. The execution times of the procedures are 7, 3, and 5 milliseconds (ms), respectively. What is the average waiting time for a processor?

Procedures	Orders of arrival	Execution time
P1	1	7
P2	2	3
P3	3	5

6. (8 pt.) Show the single precision representation to the decimal number $250.125_{10)}$

7. (20 pt.) William always encrypts texts using the RSA encryption when communicating with Judy. At this time, William selects two distinct prime numbers p = 7, q = 17, and the public key e = 5

(a). (10 pt.) Assume d is between 75 and 80; what value is modular multiplicative inverse d ?

(b). (10 pt.) Assume that the encrypted information(ciphertext) is 3, what is the original information?

8. (6 pt.) What is the difference between SRAM and SDRAM?

9. (6 pt.) How does the CPU use the pipeline technique in the operating system to decode a series of instructions?