(5) Question 1. Give the 8-bit binary representation of the value -88.

-128	yes	-88+128 = 40
64	no	40
32	yes	40-32 = 8
16	no	8
8	yes	8-8 = 0
4	no	0
2	no	0
1	no	0

1010,1000

(5) Question 2. Which of the following techniques can solve the overflow problem?

D) Implement a ceiling and floor.

F) Promote the numbers and perform the addition with this new precision.

(5) Question 3. Consider the following two instructions (yes it is silly to operate on one signed and one unsigned number)

```
ldab #-10
subb #200
```

What will be the value of the overflow (V) bit?

Convert to signed -10 and -56

Perform operation -10 - -56 = 46

Answer fits so **V=0**

What will be the value of the carry (C) bit?

Convert to unsigned 246 and 200

Perform operation 246 - 200 = 46

Answer fits so **C=0**

What will be the value of the negative (N) bit?

Answer is 46 so **N=0**

(5) Question 4. Consider the result of executing the following three 9S12 assembly instructions.

```
ldaa #100
ldab #3
mul
```

What is the value in Register B after three instructions are executed?

RegD = 100*3 = 300, so RegB=300-256 = 44

(5) Question 5. 4,000 is 3¾ decimal digits

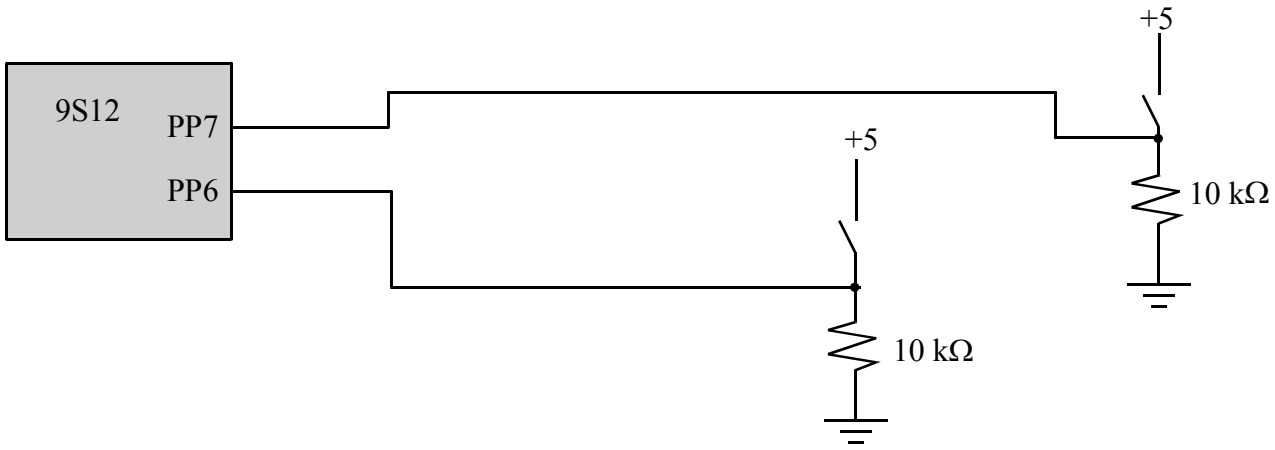
(5) Question 6. The access details of the **bsr** are SPPP, so it takes 4 cycles to execute.

(10) Question 7. Show the simplified bus cycles occurring when the **sty** instruction is executed.

$6000 7D0812 sty $0812

R/W	Addr	Data	Changes to A,B,X,Y,S,PC,IR,EAR
R	$6000	$7D	IR=$7D, PC=$6001
R	$6001	$09	PC=$6002
R	$6002	$12	EAR=$0812, PC=$6003
W	$0812	$22	
W	$0813	$33	

(15) Question 8. Draw the circuit diagram interfacing two positive logic switches.



(25) Question 9.

Part a) Write assembly code that makes PT7 an output and **Data** equal to 100.

```
;*******Init**********
; Initialize system PT7 is output, Data = 100
;Inputs: none
;Outputs: none
Init  bset DDRT,#$80  ;PT7 is an output
      ldaa #100
      staa Data       ;Data is unsigned
      rts
```

Part b) Write assembly code that sets PT7 to 1 if **Data**>25, and does not change PT7 if **Data**≤25.

```
;*******Check**********
; Check Data, if Data>25, set PT7
;Inputs: none
;Outputs: none
Check ldaa Data
      cmpa #25
      ble  no        ;*********signed branch*****************
      bset PTT,#$80  ; PT7 = 1 because Data>25
no    rts
```

(20) Question 10. Find the maximum of these two unsigned numbers and return the result in **RegA**.

```
;*****Max subroutine*********************
;Inputs:  RegA is the first number, RegB is the second number
;Outputs: RegA is the maximum of first and second
Max  cba
     bhs done  ; (or bhi) skip if RegA already larger then Reg B
     tba       ; Reg B was larger, so move B into A
done rts
```