(5) Question 1. The format is 8-bit signed. What is the hexadecimal representation of the value -60? First way using basis. -128 needed -60+128 = 68, 64 needed 68-64 = 4, 4 needed. Binary is 11000200, which is $C4. Second way, first calculate +60 = 32+16+8+4, which in binary is 00111100. Next complement 11000011, then add one 11000100 = $C4.

(5) Question 2. Which of the following techniques can be used to handle the problem of overflow?

E) Implement ceiling and floor.

G) Use promotion.

(5) Question 3. Consider the following two instructions

```
ldab #250
subb #-2
```

To determine the overflow (V) bit, first convert both to signed -128 to +127

```
ldab #-6
subb #-2          -6 – (-2) is -4, so V=0
```

To determine the carry (C) bit, first convert both to unsigned 0 to +255

```
ldab #250
subb #254         250-254 is -4, so C=1
```

(10) Question 4. For the circuit, see Figure 2.17 (b). The desired operating point is 2.6V at 10 mA.

$$R = \frac{5 - V_d - V_{OL}}{I_d} = \frac{5 - 2.6 - 0.4}{0.01} = 200\Omega$$

(10) Question 5. $0008 is pushed first, $4009 is the return address. Both numbers are big endian

$3FFC =	$40	<= SP
$3FFD =	$09	
$3FFE =	$00	
$3FFF =	$08	

Part b) The subroutine will be executed **4 times** because Y is pulled, allowing the action caused by **dex**.)

(5) Question 6. Fetch all machine bytes, then store D to memory. The effective address of **4,x** is X+4.

R/W	Addr	Data	Changes to D,X,Y,S,PC,IR,EAR
R	$4000	$6C	IR = $6C, PC = $4001
R	$4001	$04	EAR = $2004, PC = $4002
W	$2004	$11	(RegD and RegX are not changed)
W	$2005	$22	

(20) Question 7. Write an assembly code that waits until the switch at PP1 is pressed.

```
Wait ldaa PTP
     anda #$02
     beq  Wait
```

```
Wait brclr PTP,#$02,Wait
```

(20) Question 8. Write assembly code that increments all numbers of the buffer

```
      ldx  #Buffer  ;pointer
loop  ldy  0,x
      iny           ;add 1 to value
      sty  0,x
      inx
      inx
      cpx  #Buffer+200
      blo  loop
```

```
      ldx  #Buffer  ;pointer
      ldaa #100     ;loop counter
loop  ldy  0,x
      iny           ;add 1 to value
      sty  2,x+
      dbne A,loop
```

(20) Question 9. If Reg A is greater than 100, turn on the LED at PP5

```
LEDout  cmpa #100
        bls  done
        bset PTP,#$20
done    rts
```