This is a closed book exam. You must put your answers on this piece of paper only. You have 50 minutes, so allocate your time accordingly. Please read the entire quiz before starting.

(5) Question 1. Give the hex value…….

\[-90 = -128+32+4+2 = \%10100110 = \text{A6}\]

(5) Question 2. Specify 0 or 1 ……….

\[50-210 = -160, \text{doesn’t fit into 0 to 255}\]
\[C=1\]

(5) Question 3. Specify 0 or 1 ……….

\[50+(-60) = -10, \text{does fit -128 to +127}\]
\[V=0\]

(5) Question 4. Specify A-H ……….

Precision is 101 alternatives, signed

A) 8-bit signed fixed-point, \( \Delta = 0.1 \)

(5) Question 5. Show the equation….

Divide last to reduce dropout
\[Z = (123X - 660Y + 500)/1000\]

(5) Question 6. Show the machine code….

\$62, \$70

(5) Question 7. How many binary bits?…….

3½ decimal digits is 2000 alternatives
\[2048 \text{ is 11 binary bits}\]

(5) Question 8. Specify values…………

RegA=$56

RegX = $1234

(10) Question 9. Simplified memory cycles (you may or may not need all 5 entries)

<table>
<thead>
<tr>
<th>R/W</th>
<th>Addr</th>
<th>Data</th>
<th>Changes to A,B,X,Y,S,PC,IR,EAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>$4123</td>
<td>$62</td>
<td>IR=$62, PC=$4124</td>
</tr>
<tr>
<td>R</td>
<td>$4124</td>
<td>$0A</td>
<td>EAR=$380A, PC=$4125</td>
</tr>
<tr>
<td>R</td>
<td>$380A</td>
<td>$0A</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>$380A</td>
<td>$0B</td>
<td></td>
</tr>
</tbody>
</table>
(25) Part 10a) Write the main program

```
DDRM equ $0252 ; Port M Direction
DDRT equ $0242 ; Port T Direction
PTM equ $0250 ; Port M I/O Register
PTT equ $0240 ; Port T I/O Register
org $4000
main lds #$4000 ; stack grows down from $3FFF
;option 1, simple
  ldaa DDRT
  anda #$BF ; PT6 input
  oraa #$20 ; PT5 output
  staa DDRT
;option 2, efficient
  bclr DDRT,#$40 ; PT6 input
  bset DDRT,#$20 ; PT5 output
loop bsr Check
bra loop
org $FFFE
fdb main
```

(25) Part 10b) Write the assembly language subroutine.

```
;*******Check***********
; if PT6 is 1, then set PT5=1
; if PT6 is 0, then return without modifying PT5
;option 1, simple
Check ldaa PTT
  anda #$40
  beq done ; skip if PT6 is zero
  oraa #$20 ; set PT5
  staa PTT
done rts
;option 2, efficient
Check brclr PTT,#$40,done ; skip if PT6 is zero
  bset PTT,#$20 ; set PT5
done rts
```