

Jonathan W. Valvano November 19, 2001, 12:00noon-12:50pm

(25) Question 1. A low-pass FIR digital filter.

```
unsigned char x[ 9];
unsigned short sum;
unsigned char filter(unsigned char data){
    x[ 8]=x[ 7]; x[ 7]=x[ 6]; x[ 6]=x[ 5]; x[ 5]=x[ 4];
    x[ 4]=x[ 3]; x[ 3]=x[ 2]; x[ 2]=x[ 1]; x[ 1]=x[ 0];
    x[ 0]=data;
    sum = sum+x[ 0]-x[ 8]
    return sum/8;
}
```

(25) Question 2. Assume a 1 Mbyte by 8-bit RAM is connected to the MC68HC812A4.

```
void RAM_Init(void){
    MODE=0x3B // special expanded narrow mode
    PEAR=0x2C; // enable E, R/W, LSTRB
    WINDEF=WINDEF|0x80; // enable DPAGE
    MXAR=0x0F; // enable A19-A16 on Port G
    CSCTL0=CSCTL0|0x10; // enable CSD
    CSCTL1=CSCTL1&0xEF; // CSD $7000 to $7FFF
    CSSTR0=(CSSTR0&0xFC)|0x02;} // 2 cycle stretches on CSD
```

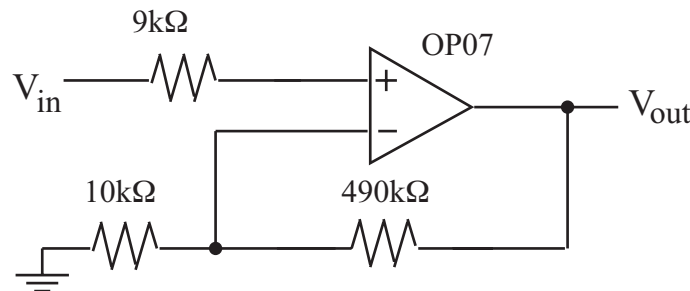
Part b) Write a memory write access function.

```
void RAM_Write(long address, char data){ char *pt;
    DPAGE = address>>12; // set address bits 19-12
    pt = (char *) (0x7000+(address&0x0FFF)); // set address bits 11-0
    *pt = data;
}
```

Part c) Write a memory read access function.

```
char RAM_Read(long address){ char *pt;
    DPAGE = address>>12; // set address bits 19-12
    pt = (char *) (0x7000+(address&0x0FFF)); // set address bits 11-0
    return *pt;
}
```

(25) Question 3. The gain needs to be $5/0.1 = 50$. The gain is $1+490/10$. So, the 9k resistor is the parallel combination of $10k||490k$ so that the effect of the bias currents is reduced.



(25) Question 4. Thread switch system

Part a) If an entry is added into POSITION A, then the `sts 2, x` and `lds 2, x` will not access the StackPt field.

Part b) We fix the bug by changing it to `sts 4, x` and `lds 4, x`

Part c) It is OK to add either 8-bit or 16-bit fields at POSITION B.