Problem:

Read a value from the keyboard, add a constant number to it's ASCII value, and display it on Tera Term using serial communication

```
// serial Reception routine

int serial_rx(void)

{

            while (!(U0LSR & 0x01));

            return (U0RBR);

}

//serial transmission routine

void serial_tx(int ch)

{

//  while ((U0LSR & 0x20)!=0x20);

  while ((U0LSR & 0x20)==0);

  U0THR = ch;

}

// serial transmission routine for string of characters

void string_tx(char *a)

{

      while(*a!='\0')

      {

        while((U0LSR&0X20)!=0X20);

        U0THR=*a;

        a++;
  }

}

/************************* main routine
***************************************************
*********/

int  main ()

{

    unsigned int Fdiv;

    char value;

    TargetResetInit();


    /**************************** uart1 initialization
************************************/

    PINSEL0 = 0x00000050;


    U0LCR = 0x83;              // 8 bits, no Parity, 1 Stop bit

    Fdiv = ( 72000000 / 16 ) / 19200 ;  //baud rate

    U0DLM = Fdiv / 256;

    U0DLL = Fdiv % 256;

 U0LCR = 0x03;              // DLAB = 0

// U0FCR = 0x07;


 while(1)

    {

        value=serial_rx();

        serial_tx(value+0x02);
```

```
            }
        return 0;
}
```

Explanation:

The serial_rx(), which is a polling function, runs on the ARM processor and waits and recieves a character from the serial port (COM port) of the PC.

The serial_tx() running on the ARM processor sends the character specified as its argument to the serial (COM port) of the PC.

On the PC side, the serial communication software used is TeraTerm. Using this software, we send and receive data through the COM port of the PC. Please note that we have to configure TeraTerm with proper COM port (check device manager) and baud rate (19200).

Unlike other programs, TargetResetInit() function is mandatory to set the PLL for proper clock configuration.

PINSEL0=0x00000050;   (Refer page 157 of LPC2378 datasheet)

The PINSEL registers control the function of the each pin of the LPC2378. Looking at PINSEL0 configuration, we can see that bit 7:6 and 5:4 are set to 01 and 01 which gives us the 32-bit number 0x00000050.

U0LCR = 0x83;   Refer page 419 of LPC2378 datasheet

U0LCR means Line Control Register. It is used to configure the UART0 of the ARM processor. Setting it to 0x00000083 means the UART0 is set for 8 bit data, 1 stop bit, parity disabled and enable access to divisor latches.

In the serial_rx() function the line

```
    while (!(U0LSR & 0x01));
```

waits for a character to be received. The bit 0 of U0LSR is set to one if data has been received. So we wait until bit 0 becomes 1. The received character is stored in register U0RBR.

In the serial_tx(char ch) function the line

```
      while ((U0LSR & 0x20)==0);
```

we are checking whether the UART0 is ready to transmit a character i,e. no transmission is in progress and U0THR register is empty.This can be checked by checking the bit 5 of U0LSR. If it is 0 transmission is in progress and we have to wait till it is completed. Once the transmission is over, the bit is set to 1.

Then, we just need to put the character to be transmitted in the

U0THR register. The UART will transmit it.

Baud rate setting:

```
Fdiv = ( 72000000 / 16 ) / 19200 ;  //baud rate
        U0DLM = Fdiv / 256;
        U0DLL = Fdiv % 256;
```

Please refer to page number 414 and 415 to see the formula for deriving the baud rate.