Project #5(Pjt05_uart_intr_race)

Step 1

- UART0 interrupt based TX : (race condition)

```
void  uart_init()
{
    UBRR0H = 0x00; UBRR0L = 0x07;// 115.2K
    UCSR0A |= (1 << U2X0);
    UCSR0B |= (1 << TXEN0);
    UCSR0B |= (1 << TXCIE0);     // TX complete interrup
}
char  buf[64];
int   volatile  bufi, txend = 1;
int   uart_putstart(char str[])
{
    char ch; int  n = strlen(str);
    while(sizeof(buf) - strlen(buf +bufi) -1 < n);
    strcpy(buf, buf + bufi); strcat(buf, str);
    bufi = 0;
    if (txend) {
            txend = 0;
            ch = buf[bufi++];
            UDR0 = ch;
    }
}
```

```
main()
{
   int   i;
   uart_init();
   sei();
   for (i = 0; i < 10; i++) {
     uart_putstart( "I love you.₩n" );
     uart_putstart( "You love me.₩n" );
     uart_putstart( "He loves her.₩n" );
   }
   uart_putstart( "End !!!₩n" );
   while(1);
}
```

```
#include <avr/interrupt.h>
ISR(USART0_TX_vect)
{
   char  ch = buf[bufi];

   if (!ch) {
       bufi = 0, txend = 1; return;
   }
   if (ch ==  '₩n' )
       buf[bufi] =  '₩r' ;
   else
       bufi++;
   UDR0 = ch;
}
```

Project #5(Pjt05_uart_intr_race)

Step 2

UART0 interrupt based TX : (mutual exclusion)

```
void  uart_init()
{
   UBRR0H = 0x00; UBRR0L = 0x07;// 115.2K
   UCSR0A |= (1 << U2X0);
   UCSR0B |= (1 << TXEN0);
   UCSR0B |= (1 << TXCIE0);     // TX complete interrupt enab
}
char  buf[64];
int   volatile  bufi, txend = 1;
int    uart_putstart(char str[])
{
     char ch; int  n = strlen(str);
    while(sizeof(buf) - strlen(buf +bufi) -1 < n);
    cli();
    strcpy(buf, buf + bufi); strcat(buf, str);
    bufi = 0;
    if (txend) {
             txend = 0;
             ch = buf[bufi++];

            UDR0 = ch;
    }
    sei();
}
```

```
main()
{
   int   i;
   uart_init();
   sei();
   for (i = 0; i < 10; i++) {
     uart_putstart( "I love you.₩n" );
     uart_putstart( "You love me.₩n" );
     uart_putstart( "He loves her.₩n" );
   }
   uart_putstart( "End !!!₩n" );
   while(1);
}
```

```
#include <avr/interrupt.h>
ISR(USART0_TX_vect)
{
   char  ch = buf[bufi];

   if (!ch) {
       bufi = 0, txend = 1; return;
   }
   if (ch ==  '₩n' )
       buf[bufi] =  '₩r' ;
   else
       bufi++;
   UDR0 = ch;
}
```