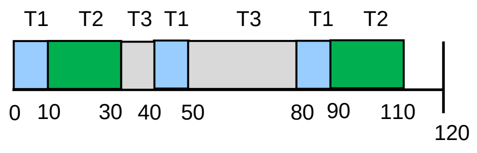
Solution 2

1.
```
#define PBIN (volatile unsigned char *) 0xFFFFFFF3
#define PBOUT (volatile unsigned char *) 0xFFFFFFF4
#define PBDIR (volatile unsigned char *) 0xFFFFFFF5
#define PSTAT (volatile unsigned char *) 0xFFFFFFF6
#define CNTM (volatile unsigned int *) 0xFFFFFFD0
#define CTCON (volatile unsigned char *) 0xFFFFFFD8
#define CTSTAT (volatile unsigned char *) 0xFFFFFFD9
#define IVECT (volatile unsigned int *) (0x20)

interrupt void intserv();

volatile unsigned char digit = 0;         /* digit for display */

int main() {
  unsigned char sample = 0;               /* Port B input sample */

  *PBDIR = 0xF0;                          /* Set Port B direction */
  *CTCON = 0x2;                           /* Stop Timer (if running) */
  *CTSTAT = 0x0;                          /* Clear "Reached 0" flag */
  *CNTM = 100000000;                      /* Initialize: 1-s timeout */
  *IVECT = (unsigned int *) &intserv;     /* Set interrupt vector */
  asm("MoveControl PSR,#0x40");           /* CPU responds to IRQ */
  *CTCON = 0x1;                           /* Start Timer, disable
                                             interrupts for now */
  *PBOUT = 0x0;                           /* Display 0 */
  while (1) {
    while ((*PSTAT & 0x4) == 0);          /* Wait for PBIN update */
    sample = *PBIN & 0x3;     /* Sample PBIN, isolate bits [1:0] */
    if (sample == 0x1)        /* E = 0, D = 1 */
      *CTCON |= 0x10;         /* Enable Timer interrupts */
    else if (sample == 0x2)   /* E = 1, D = 0 */
      *CTCON &= 0xEF;         /* Disable Timer interrupts */
  }

  exit(0);
}

interrupt void intserv() {
  *CTSTAT = 0x0;              /* Clear "Reached 0" flag */
  digit = (digit + 1)%10;     /* Increment digit */
  *PBOUT = digit << 4;        /* Update display */
}
```

2.
```
#define PBIN (volatile unsigned char *) 0xFFFFFFF3
#define PBOUT (volatile unsigned char *) 0xFFFFFFF4
#define PBDIR (volatile unsigned char *) 0xFFFFFFF5
#define PCONT (volatile unsigned char *) 0xFFFFFFF7
```

```
#define CNTM (volatile unsigned int *) 0xFFFFFFD0
#define CTCON (volatile unsigned char *) 0xFFFFFFD8
#define CTSTAT (volatile unsigned char *) 0xFFFFFFD9
#define IVECT (volatile unsigned int *) (0x20)

interrupt void intserv();

int main() {
  char digit = 0;                          /* Digit to be displayed */

  *PBDIR = 0xF0;                           /* Set Port B direction */
  *IVECT = (unsigned int *) &intserv;      /* Set interrupt vector */
  asm("MoveControl PSR,#0x40");            /* CPU responds to IRQ */
  *PCONT = 0x40;                           /* Enable PBIN interrupts */
  *CTCON = 0x2;                            /* Stop Timer */
  *CSTAT = 0x0;                            /* Clear "reached 0" flag */
  *CNTM = 100000000;                       /* Initialize Timer */
  *PBOUT = 0x0;                            /* Display 0 */

  while (1) {
    while ((*CTSTAT & 0x1) == 0);          /* Wait until 0 is reached */
    *CSTAT = 0x0;                          /* Clear "reached 0" flag */
    digit = (digit + 1)%10;                /* Increment digit */
    *PBOUT = digit << 4;                   /* Update display */
  }

  exit(0);
}

interrupt void intserv() {
  unsigned char sample;        /* Port B input sample */
  sample = *PBIN & 0x3;        /* Sample PBIN, isolate bits [1:0] */
  if (sample == 0x1) *CTCON = 0x1;         /* Start Timer */
  else if (sample == 0x2) *CTCON = 0x2;    /* Stop Timer */
}
```

3.
The LCM (least common multiple) of all four periods is 120, i.e., we only need to determine our EDF schedule in the time interval **[0, 120)**, after which it is repeated:



EDF task priorities are (1/40, 1/80, 1/120) for T1, (1/60, 1/120) for T2, and (1/100) for T3. When T1 and T2 have the same priority, we (arbitrarily) let T1 win over T2.