模块 13

活动： 定时器

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问题1

MSP432上有一个32位定时器。 如果此定时器的时钟频率为12 MHz，那么创建周期性中断的最慢时间是多少？

问题 2

在 32 位定时器上读取 MSP432 数据表。 编写使用此定时器执行周期性任务的软件，Task（），每秒一次。

问题 3

使用Timer A2示例而不更改Timer A2初始化，从讲座幻灯片，每秒运行Task1一次，Task2每秒运行两次，Task3每秒运行三次。要减少延迟，请将其设置为在同一ISR期间不运行任何两个任务。 假设SMCLK为12 MHz。

问题 4

编写软件以产生 4 个周期为 1ms 的 PWM 周期，但具有独立的占空比。

问题 5

列出可用于生成 PWM 输出的所有 MSP432 引脚。

问题 6

读取 **Timer_A** 模块的 MSP432 数据表。 描述该软件系统的特性，假设主程序调用 TimerA0_Init 然后启用中断。

```
#define N1 1000
#define N2 1500
#define N3 2000
void TimerA0_Init(void){
  TA0CTL &= ~0x0030;        // 0) halt Timer A0
  TA0CTL = 0x0240;          // 1) SMCLK, divide by 2
  TA0EX0 = 0x0005;          //    divide by 6
  TA0CCTL1 = 0x0010;        // 2) compare mode, arm CCIFG
  TA0CCTL2 = 0x0010;        //    compare mode, arm CCIFG
  TA0CCTL3 = 0x0010;        //    compare mode, arm CCIFG
  TA0CCR1 = N1/2;           // 3) time of first interrupt
  TA0CCR2 = N2/2;           //
  TA0CCR3 = N3/2;           //
  NVIC_IPR2 = (NVIC_IPR2&0xFFFF00FF)|0x00004000;
  NVIC_ISER0 = 0x00000200; // 5) enable interrupt 9
  TA0CTL |= 0x0024;         // 6) reset and start
}

void TA0_N_IRQHandler(void){
  if(TA0CCTL1&0x0001){
    TA0CCTL1 &= ~0x0001;    // acknowledge interrupt 1
    TA0CCR1 = TA0CCR1+N1;   // set up for next time
    Task1();                // execute user task
  }
  if(TA0CCTL2&0x0001){
    TA0CCTL2 &= ~0x0001;    // acknowledge interrupt 2
    TA0CCR2 = TA0CCR2+N2;   // set up for next time
    Task2();                // execute user task
  }
  if(TA0CCTL3&0x0001){
    TA0CCTL3 &= ~0x0001;    // acknowledge interrupt 3
    TA0CCR3 = TA0CCR3+N3;   // set up for next time
    Task3();                // execute user task
  }
}
```

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