

## Postlab 1

1. What are the GPIO control registers that the lab mentions? Briefly describe each of their functions.

**GPIOx\_MODER** - without configuring this register, using GPIO pins as anything aside from digital inputs is not possible.

**GPIOx\_OTYPER** - This register selects the output mode you want for each pin.

**GPIOx\_OSPEEDR** - disables and/or reduces the speed of the peripherals, like putting them in low or high speed.

**GPIOx\_PUPDR** - This register connects internal pull-up or pull-down “resistors” to a pin;

**GPIOx\_IDR** – Read only bit that reports the logical state of each pin in the GPIO port.

**GPIOx\_ODR** - This register sets the logical state of configured output pins.

**GPIOx\_BSRR** - This register is write-only: the reason is that this register is a shortcut to set and clear bits quickly in the output register.

**GPIOx\_LCKR** - The configuration lock register locks the other configuration registers for the associated pin;

**GPIOx\_AFRL/GPIOx\_AFRH** - necessary to configure alternate functions for all 16 pins

**GPIOx\_BRR** - This reset-only register is essentially a copy but with the clearing bits in the lower half.

2. What values would you want to write to the bits controlling a pin in the GPIOx\_MODER register in order to set it to analog mode?

0b11

3. Examine the bit descriptions in GPIOx\_BSRR register: which bit would you want to set to clear the fourth bit in the ODR?

Bit 20

4. Perform the following bitwise operations:

- $0xAD \mid 0xC7 = 10101101 \mid 11000111 = 0b11101111$
- $0xAD \& 0xC7 = 10101101 \& 11000111 = 0b10000101$
- $0xAD \& \sim(0xC7) = 10101101 \& \sim 11000111 = 0b00101000$
- $0xAD \wedge 0xC7 = 10101101 \wedge 11000111 = 0b01101010$

5. How would you clear the 5th and 6th bits in a register while leaving the other's alone?  
Register  $\&= \sim(1 \ll 5 \mid 1 \ll 6)$

6. What is the maximum speed the STM32F072R8 GPIO pins can handle in the lowest speed setting?

## Tenace Crane

- Use the chip datasheet: lab section 1.4.1 gives a hint to the location. You'll want to search the I/O AC characteristics table. You will also need to view the OSPEEDR settings to find the bit pattern indicating the slowest speed.

If  $V \geq 2$  then the max frequency of max(IO)out is 2Mhz and if  $V < 2$  then it's 1Mhz

7. What RCC register would you manipulate to enable the following peripherals: (use the comments next to the bit defines for better peripheral descriptions)

- TIM1 (TIMER1)  
RCC\_APB2ENR
- DMA1  
RCCC\_AHBENR
- I2C1  
RCC\_APB1ENR