**TO:** Prof. Pierre-Emmanuel Gaillardon, Course Instructor
**FROM:** David Venegas
**DATE:** February 13th, 2024
**SUBJECT:** Pre-Lab 03 (Timers)

1. **List two things you can learn from a peripheral's functional description in the peripheral reference manual:**
- Explanation of the purpose of each operating mode
- Relevant registers and configuration options

2. **What is the title of the first sub-section in the functional description of timers 2 and 3?**

Time-based unit

3. **What is the purpose of the Prescaler (PSC) register?**

The PSC register divides the input clock frequency to the timer. Its value is 0-indexed, meaning that a value of 0 in the PSC register divides the clock source by 1 (no frequency scaling); likewise, a value of 1 in the PSC register divides the clock source by 2 and causes the timer to count at half the clock frequency. The PSC can divide the input clock by any integer value that fits in its 16-bit width.

4. **What is the purpose of the Auto-Reload (ARR) register?**

The value in the ARR register is the trigger point at which the timer resets and begins to count a new period. The actual behavior of the timer depends upon its counting mode.

5. **What is the purpose of the Capture/Compare (CCRx) register while the timer is operating in Output Compare mode?**

The output compare mode modifies the output of a GPIO pin whenever the timer's counter matches the value stored in the CCRx register. Depending on the configuration, an output compare channel can set, clear, or toggle its pin on a counter match.

6. **What does the duty-cycle of a PWM signal represent?**

Represents an analog voltage ranging between the low and high voltages of the digital signal.

7. **What is the purpose of the Alternate Function mode for a GPIO pin?**

Allowing a pin to connect directly to internal peripherals of the STM32F0 is the purpose of the alternate function mode.

8. **In what document can you find the documentation for what GPIO pins have which alternate functions?**

Alternate function assignments are specific to the STM32F0 device used. This means that the information on pin alternate functions is found within the device datasheet and not the peripheral reference manual. The STM32F072xB datasheet and navigate to Section 4 Pinouts and Pin Descriptions. This section provides documentation on all of the chip packages available for the device. It also provides tables with pinout details, including alternate functions.