ICE 4

1. a. MCU peripheral units
   - GPIO
   - ADC
   - TIMER
   - Interrupts
   - PWM

b. GPIO ports/pins
   - Port B
     - PB0 : UART Rx
     - PB1 : UART Tx
     - PB4 : AIN10
     - PB5 : SERVO 2
   - Port C
     - PC4 : UART Rx
     - PC5 : UART Tx
   - Port E
     - PE0-3 : PB_SWx
   - Port F
     - PF0 : USR_SW2
     - PF1-4 : LCD_DATAx
   - Port D
     - PD6 : LCD_RW
     - PD3 : LCD_RS
     - PD2 : LCD

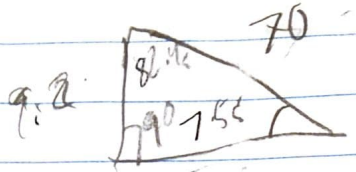
2. a. PING Sensor
   2cm to 3 meters

   IR Sensor:
   10cm to 80cm

b. PING Sensor:
   Includes all areas except for the fourth region from the left
   Functional range 5-278cm

   IR Sensor:
   Picks up the 4th region from the left and the 5th region from the right
   Functional range 9-50cm

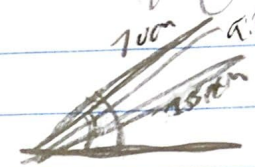
3. a. $d = 70\text{cm}$



$\tan(x) = \frac{a.l}{70}$; 7.55°

arc length

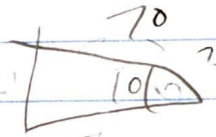
$7\pi\left(\frac{35}{180}\right)$



155

6. $d = 70$

$a = 10$



10°

$w = r \times a.l \times \frac{\pi}{180}$ $\quad 70(10°) \cdot \frac{\pi}{180}$

$w =$ 12.21730

4. a. by using the arc length to find the proper angle of the range of what object it picks up. It sends out a infared ray and based on what the ray comes back it calculates what it picks.

b. by using the arc length with the IR sensor you combine that with the distance from the PING sensor. This is done by scanning the area until waves of sound that reflect off

5. If one of the objects are too close to each other than the PING or IR sensor might consider it as one large object or won't pick up the object that is farther from it. Also if you don't have the range/width of the object set correctly than it could mistake a smaller peg for a larger one and vise versa. Calibrating the sensor can help with this issue.