

HOMEWORK 2

Please complete the following and submit your worksheet electronically before the deadline

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Question 1:

Part 1.a

Refer to Tutorial for LAB2, page 21, based on your student ID, you have Pin Set from A to G

Please fill in the following table based on your student ID. If the two digits are 00, then Pin number = 100

Pin Set G is filled as an example. ****PAY Attention to the ORDER of your Pin Sets****

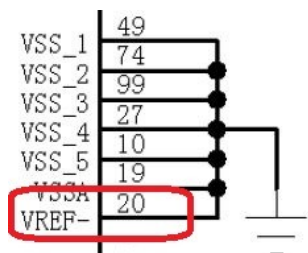
Pin Set	Actual Pin Number on STM32	Default Function of the pin on 100pin STM32F103VET6
A	89	PB3
B	58	PD11
C	05	PE6
D	40	PE9
E	74	VSS
F	07	PC13
G	20	VREF-

Part 1.b

With reference to the updated MINI V3 schematic dated 20210304, for Pin **Set C, E and F**, locate where the pins are connected. Cut and Paste the detailed schematic, highlight it and attached below.

DO NOT USE LEFT SIDE OF PAGE 2 which listed all the Port Pins from PA0 to PE15.

Example: Pin Set G



Pin Set C	Pin Set E	Pin Set F

Part 1.c

With the Pin Set C, E and F you have, fill out the following table

	Pin Set C	Pin Set E	Pin Set F
Following the connection on the schematic, if I want to set that Pin to GPIO input, what mode I can program the pin into?	GPIO_PULLUP GPIO_PULLDOWN GPIO_NOPULL	GPIO_PULLUP GPIO_PULLDOWN GPIO_NOPULL	GPIO_PULLUP GPIO_PULLDOWN N
Please circle ALL the possible options. If the pin cannot be programmed to input, please circle N/A	N/A	N/A	GPIO_NOPULL N/A

Question 2:

Part 2.a

Assume a 2-minute stereo sound is being sampled at 24 kHz with 12-bit per channel, what would be the data size of the sound file in bytes? Show your calculation.

Time = 120 s, bits per sample = 12 bits, channel count = 2, sampling rate = 24,000

Filesize = sampling rate * bits per sample * channel count * time

= 24000 * 12 * 2 * 120

= 69120000 bits / 8

= 8640000 bytes

Part 2.b

With the sampling rate at 24 kHz, what is the time between each sample? Show your calculation.

Time between sample = $1/24k = 0.00004166666 \text{ s} = 41.6666 \text{ us}$

Part 2.c

With the sample time that you calculate in *Part 2.b* if we want to implement the sampling from the ADC of STM32 with different settings below. What is the total number of cycles needed? Hence, calculate the conversion time (Tconv) for the different settings

Total conversion time, Tcycle = sample cycles + 12.5 (conversion cycles)

	CLK (MHz) at the input before ADC Prescaler	ADC Prescaler (2/4/6/8)	ADCCLK (MHz) Max 14 MHz	ADC sample time register (cycles) (1.5 – 239.5)	Total conversion time, Tcycle Sample time (cycles)	Tconv (µsec)
Setting 1	8	6	1.3333	1.5	14	10.5
Setting 2	12	4	3	28.5	41	13.67
Setting 3	56	4	14	55.5	68	4.86
Setting 4	72	8	9	239.5	252	28

Part 2.d

Can sampling in *Part 2.b* be achieved with the conversion time (Tconv) you calculated in *Part 2.c* for Setting 1 to 4? Please circle the correct answer and calculate the additional delay needed for different settings to achieve the goal.

	Can sampling be achieved	Additional Delay needed (µsec)
Setting 1	YES / NO	31.17
Setting 2	YES / NO	28
Setting 3	YES / NO	36.81
Setting 4	YES / NO	13.67