

This print-out should have 13 questions. Multiple-choice questions may continue on the next column or page – find all choices before making your selection. The due time is Central time.

EE345L Valvano Homework 4. When possible, software should be friendly. This means you should only set bits that need to be set, leaving the other bits in a register unmodified.

001 (part 1 of 1) 10 points

Which of the following statements best describes a **device driver**?

1. A device driver is used to separate mechanism from policy with respect to I/O operation.
2. All of these choices are correct.
3. A device driver is a set of programs that facilitate the use of an I/O device.
4. A device driver provides both functional abstraction and complexity abstraction of the I/O process.
5. A device driver is a collection of software functions that allow higher level software to utilize an I/O device.
6. A device driver is a set of low-level functions that input/output directly with the hardware are grouped together in a single module.

002 (part 1 of 1) 10 points

Which answer best describes the procedure one follows to configure a single port pin as an input? For example, we wish to make PT1 an input.

1. The pins on the 6812 are predetermined as either input or output, so one simply uses one of the input pins.
2. The initialization program sets the 8-bit direction register to 0xFF.
DDRT = 0xFF;

3. The initialization program sets the corresponding bit in the direction register to 1.

DDRT |= 0x02;

4. The initialization program sets the corresponding bit in the direction register to 0.

DDRT &= 0xFD;

5. The initialization program sets the 8-bit direction register to 0.

DDRT = 0x00;

6. The initialization program sets the corresponding bit in the data register to 1.

PTT |= 0x02; (for 9S12C32)

PORTT |= 0x02; (for 812A4)

7. The initialization program sets the corresponding bit in the data register to 0.

PTT &= 0xFD; (for 9S12C32)

PORTT &= 0xFD; (for 812A4)

003 (part 1 of 1) 10 points

Which answer best describes the procedure one follows to configure a single port pin as an output? For example, we wish to make PT2 an output.

1. The initialization program sets the 8-bit direction register to 0xFF.

DDRT = 0xFF;

2. The initialization program sets the corresponding bit in the direction register to 0.

DDRT &= 0xFB;

3. The pins on the 6812 are predetermined as either input or output, so one simply uses one of the output pins.

4. The initialization program sets the corresponding bit in the direction register to 1.

DDRT |= 0x04;

5. The initialization program sets the 8-bit direction register to 0.

DDRT = 0x00;

004 (part 1 of 1) 10 points

Assume port C bit 0 is already configured as an output pin. The purpose of the following C code is to clear output bit 0 low.

PORTC &= ???;

What numerical value should you use in the ??? position in the above program? Give your answer as an unsigned 8-bit decimal integer between 0 and 255.

005 (part 1 of 1) 10 points

Assume port C bit 7 is already configured as an output pin. The purpose of the following C code is to set output bit 7 high.

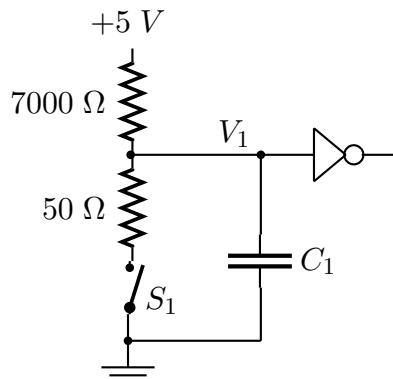
PORTC ??? = 128;

Which C operator should you use in the ??? position in the above program?

1. |
2. =
3. none of these choices is correct
4. &
5. & =
6. |=

006 (part 1 of 2) 10 points

The following figure shows the electronic circuit used to interface a switch to an input port of the microcomputer.



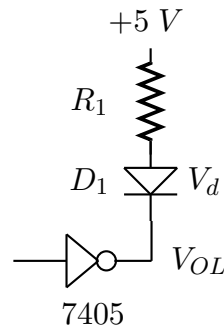
What is the voltage V_1 when the switch is not pressed (the switch is an open circuit)? Answer in units of volts.

007 (part 2 of 2) 10 points

What is the voltage V_1 when the switch is pressed (the switch is a closed circuit)? Answer in units of volts.

008 (part 1 of 1) 10 points

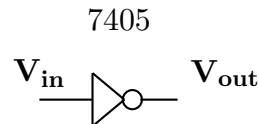
The following figure shows the electronic circuit used to interface an output port of the microcomputer to a LED. Assume the value of desired operating point of the LED is $V_d = 2\text{ V}$, and $I_d = 16\text{ mA}$. Assume also the output low voltage of the 7405 is $V_{OL} = 0.5\text{ V}$.



What value for the resistor R_1 should be used? Answer in units of Ω .

009 (part 1 of 1) 10 points

The 7405 is an open collector inverter used to interface LEDs to the microcomputer.



Which answer best describes the input/output functionality of the 7405?

1. None of these choices is correct.
2. If V_{in} is low then V_{out} will be low. If V_{in} is high then V_{out} will be off, which means neither high or low.
3. If V_{in} is low then V_{out} will be high. If

V_{in} is high then V_{out} will be low.

4. If V_{in} is low then V_{out} will be low. If V_{in} is high then V_{out} will be high.

5. If V_{in} is low then V_{out} will be off, which means neither high or low. If V_{in} is high then V_{out} will be low.

010 (part 1 of 1) 10 points

Which answer best describes the interrupt arm bit?

1. It is a bit in the CCR that allows or prevents all interrupts.

2. It is a bit in a specific I/O device that is set by hardware to signal an interrupt is needed.

3. When the software sets this bit an interrupt is always generated immediately.

4. This bit specifies whether the interrupt channel is vectored or polled.

5. This bit establishes interrupt priority.

6. It is a bit in a specific I/O device that is set by the initialization software to allow this device to request interrupts.

011 (part 1 of 1) 10 points

Which answer best describes an interrupt vector?

1. The interrupt vector holds the arm bits used for interrupt control.

2. The interrupt vector is special software that is executed when an interrupt is requested.

3. The interrupt vector is a 16-bit address pointing to the interrupt service routine.

4. The interrupt vector contains the new SP used when servicing an interrupt.

5. The interrupt vector is the action of pushing the registers on the stack and running the interrupt service routine.

6. The interrupt vector specifies whether the interrupt channel is vectored or polled.

012 (part 1 of 1) 10 points

On the 812A4, the **RTIF** bit is in the **RTIFLG** register. On the 9S12C32, the **RTIF** bit is in the **CRGFLG** register. Which of the following statements best describes the software action that will set the real time interrupt flag bit **RTIF** on the 6812?

1. The software executes the **sei** instruction.

2. The software can not set **RTIF**, but this bit is periodically set by the timer hardware.

3. The software writes a 1 to the **RTIF** bit.

4. The software reads the TCNT register.

5. The software executes the **cli** instruction.

6. The software writes a 0 to the **RTIF** bit.

013 (part 1 of 1) 10 points

On the 812A4, the **RTIF** bit is in the **RTIFLG** register. On the 9S12C32, the **RTIF** bit is in the **CRGFLG** register. Which of the following statements best describes the action that will clear the real time interrupt flag bit **RTIF** on the 6812?

1. The software reads the TCNT register.

2. The software executes the **cli** instruction.

3. The software can not clear **RTIF**, but this bit is periodically cleared by the timer

hardware.

4. The software writes a 1 to the **RTIF** bit.

5. The software writes a 0 to the **RTIF** bit.

6. The software executes the **sei** instruction.