

This print-out should have 12 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 7.

001 (part 1 of 1) 10 points

Assume the magnitude of the analog input signal applied to the ADC is 2.52 volts. What numerical value would be returned by the built-in 8-bit ADC of the MC68HC812A4? Give your answer as an unsigned 8-bit decimal number between 0 and 255.

002 (part 1 of 1) 10 points

Assume the magnitude of the analog input signal applied to the ADC is 1.72 volts. What numerical value would be returned by the built-in 10-bit ADC of the 9S12C32? Give your answer as an unsigned 10-bit decimal number between 0 and 1023.

003 (part 1 of 1) 10 points

Which bit turns on the internal ADC hardware for the 6812?

1. **CCF0**
2. **AWAI**
3. **ASCIE**.
4. **ADPU**
5. **TEN**
6. **SCF**
7. **AFFC**

004 (part 1 of 1) 10 points

If you are solving this problem with the MC68HC812A4, the ADC data registers, referred to in this problem as ADC data registers 0 through 7, correspond to **ADR0H** through **ADR7H**. If you are solving this problem with the 9S12C32, the ADC data registers, referred to in this problem as ADC

data registers 0 through 7, correspond to **ATDDR0** through **ATDDR7**. Assume the ADC is started by writing the number **4** into the **ATDCTL5** register. After the ADC conversion(s) is(are) complete, where will the ADC result(s) be found?

1. Only one ADC conversion will occur and the result will be placed in ADC data register 0.
2. Four ADC conversions occur and the results will be placed in ADC data registers 4, 5, 6, and 7.
3. Four ADC conversions occur and the results will be placed in ADC data registers 0, 1, 2, and 3.
4. Only one ADC conversion will occur and the result will be placed in ADC data register 4.
5. Eight ADC conversions occur and the results will be placed in ADC data registers 0 through 7.

005 (part 1 of 1) 10 points

Assume the fast clear option is disabled, i.e., the bit **AFFC** is zero. Which of the following statements best describes the action that will clear the **CCF0** bit in the ADC status register on the 6812?

1. The software reads the status register when the the **CCF0** bit is a one, followed by the software reading the associated ADC data register.
2. The ADC automatically clears the **CCF0** bit when the software writes to the **ATDCTL2** register.
3. The software writes a 0 to the **CCF0** bit.
4. The software writes a 1 to the **CCF0** bit.

5. The software reads the associated ADC data register.

6. The ADC hardware automatically clears the **CCF0** bit after the analog to digital conversion is complete.

006 (part 1 of 1) 10 points

Assume the fast clear option is disabled, i.e., the bit **AFFC** is zero. Which of the following statements best describes the action that will clear the **SCF** bit in the ADC status register on the 6812?

1. The ADC hardware automatically clears the **SCF** bit after the analog to digital conversion is complete.

2. The software writes a 0 to the **SCF** bit.

3. The software reads the associated ADC data register.

4. The ADC automatically clears the **SCF** bit when the software starts a new ADC sample by writing to the **ATDCTL5** register.

5. The software reads the status register when the the **SCF** bit is a one, followed by the software reading the associated ADC data register.

6. The ADC automatically clears the **SCF** bit when the software writes to the **ATDCTL2** register.

007 (part 1 of 1) 10 points

Assume the ADC precision is 10 bits, and the range is from 0 volts to 5 volts.

What is the resolution of this ADC? Give your answer in volts.

Answer in units of volts.

008 (part 1 of 1) 10 points

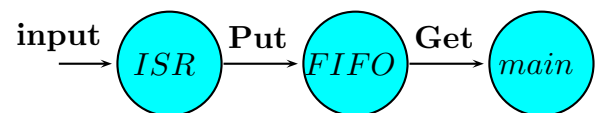
The goal of the system is to measure position. The desired measurement range is 0 to 85 cm. The desired measurement resolution

is 0.398 cm. Assume a linear transducer and a linear analog amplifier maps the full-scale input range of 0 to 85 cm into the full-scale ADC range of 0 to +5V. What is the smallest number of ADC bits that can be used? Give your answer as a whole number in bits.

Answer in units of bits.

009 (part 1 of 2) 10 points

The following figure shows a data flow graph for a buffered input interface. In other words this is a producer-consumer problem. An interrupt occurs whenever new input data is available. The interrupt service routine will read the new **input** and **put** it in the FIFO queue. The foreground thread (main program) will **get** data out of the FIFO queue and process it.



Debugging instruments placed on the FIFO have recorded the condition that the FIFO is usually empty, or at most contains one element. What term best describes this situation?

1. round-robin.

2. single-threaded.

3. nonreentrant.

4. CPU bound.

5. I/O bound.

010 (part 2 of 2) 10 points

Which action will result in the largest increase in bandwidth?

1. Choose a more efficient compiler.

2. Choose a faster microcomputer.

3. Make the FIFO larger.

4. None of these actions can increase bandwidth.

5. Choose a faster input device.

5. Switch from interrupts to busy-wait (gad-fly) synchronization.

011 (part 1 of 2) 10 points

The following figure shows a data flow graph for a buffered output interface. In other words this is a producer-consumer problem. Whenever the main program wishes to output, it will **put** data in the FIFO. An interrupt occurs whenever the output device is idle. The interrupt service routine will **get** data out of the FIFO queue and send it to the **output** device hardware.



Debugging instruments placed on the FIFO have recorded the condition that the FIFO is usually empty, or at most contains one element. What term best describes this situation?

1. round-robin.
2. I/O bound.
3. nonreentrant.
4. single-threaded.
5. CPU bound.

012 (part 2 of 2) 10 points

Which action will result in the largest increase in bandwidth?

1. Choose a faster output device.
2. None of these actions can increase bandwidth.
3. Make the FIFO larger.
4. Choose a faster microcomputer.