Student Name:_____ Student ID: _____

Problem 1

Write a subroutine that will initiate an 8-bit single conversion sequence on channel 7, wait for the results to become valid (through polling) and then transfer the result(s) into the location(s) at $2000.

Assume that the ATD is already powered-up (no need to enable core), that interrupts are disabled, that timing related input to the core is correct and that the precision is set correctly as well (i.e. 8 or 10 bits).

Hint: Can be done in 4 instructions including RTS.

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Problem 2

MAIN CODE

```
------------------------------------
coma
staa  $3000   <-- RTI IRQ occurs here
```

ISR

```
-----------------------------------
rti_isr:   ldaa   $2000
           inca
           staa   $2001
           rti
```

Table 1

Location	Prior to COMA	After STAA in main code	Just Prior to RTI	Just after RTI
reg A	$10			
reg B	$20			
reg D				
reg X	$3000			
reg Y	$0000			
Mem $2000	$01			
Mem $2001	$02			
Mem $3000	$03			
Mem $3001	$04			

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Problem 3

Write a subroutine to initialize the PWM peripheral with two active channels:

1) Channel 5 running at 10 KHz and 72% duty cycle

2) Channel 6 running at 10 KHz and 49% duty cycle

3) All other channels (1-4 and 7) should be disabled.

Show all calculations and ensure values with 5% tolerance.

5 Point bonus if you can reduce the duty cycle error to the minimum that the HCS12 is capable of.