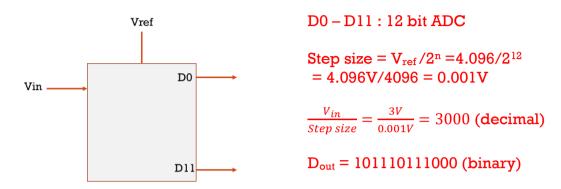
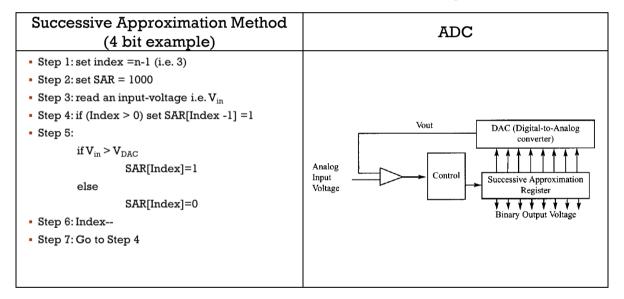
CMPE 451, Section 2

Ouiz 4

1. Calculate the digital output for a microcontroller with an ADC shown below, for $V_{\rm in} = 3V$ and $V_{\rm ref} = 4.096V$ (30 pts)



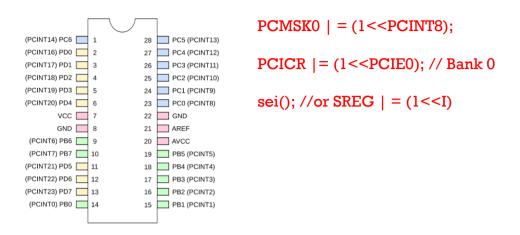
2. For an ADC with V_{ref} = 2.56V and given incomplete table of successive approximation, calculate $V_{DAC}(s)$ and estimate the range for V_{in} (40 pts.)



Step size =
$$V_{ref}/2^n = 2.56/2^4 = 0.16$$
 $V_{DAC} = (SAR) \times Step size$

Vin	SAR	$V_{ exttt{DAC}}$	Comment	Index	Index-1
1.6 – 1.76V	1000	1.28	$Vin > V_{DAC}$	3	2
	1100	2.24	$Vin < V_{DAC}$	2	1
	1010	1.6	$Vin > V_{DAC}$	1	0
	1011	1.76	$Vin < V_{DAC}$	0	-1
	1010	1.6			

3. Write a C code to enable an interrupt via PC0 pin of Atmega328P. Corresponding registers are given below. (30 pts.)



Bit	7	6	5	4	3	2	1	0	
(0x6B)	PCINT7	PCINT6	PCINT5	PCINT4	PCINT3	PCINT2	PCINT1	PCINT0	PCMSK0
Read/Write	R/W								
Initial Value	0	0	0	0	0	0	0	0	
Bit	7	6	5	4	3	2	1	0	
(0x6C)	-	PCINT14	PCINT13	PCINT12	PCINT11	PCINT10	PCINT9	PCINT8	PCMSK1
Read/Write	R	R/W							
Initial Value	0	0	0	0	0	0	0	0	
Bit	7	6	5	4	3	2	1	0	
(0x6D)	PCINT23	PCINT22	PCINT21	PCINT20	PCINT19	PCINT18	PCINT17	PCINT16	PCMSK2
Read/Write	R/W	•							
Initial Value	0	0	0	0	0	0	0	0	
Bit	7	6	5	4	3	2	1	0	
(0x68)	-	-	_	_	-	PCIE2	PCIE1	PCIE0	PCICR
Read/Write	R	R	R	R	R	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	
Bit	7	6	5	4	3	2 1	0		
0x3F (0x5F)	ı	T	Н	S	V	N Z	C	SREC	}
Read/Write	R/W	R/W	R/W	R/W	R/W R	R/W R/	W R/V	V	
Initial Value	0	0	0	0	0	0 0	0		