

EE M16/CS M51A S'15 Quiz #1

1. (8 points)

(a) (4 points)

To represent the decimal integer *one hundred sixty two* (162_{10}),
 at least 5 digits are required in **radix-3** system;
 at least 3 digits are required in **radix-7** system.

2 points each

Show all your work below for the credit:

$$3^4 - 1 < 162 < 3^5 - 1$$

$$7^2 - 1 < 162 < 7^3 - 1$$

(b) (4 points)

Convert the numbers to different number systems in the following table:

Radix-10	Radix-16	Radix-5
205	CD	1310
23	17	43

1 point each

Show all your work below for the credit:

$$(CD)_{16} = (12 \times 16 + 13)_{10} = (205)_{10} = (1310)_5$$

$$(43)_5 = (4 \times 5 + 3)_{10} = (23)_{10} = (17)_{16}$$

$$16 \overline{) 23} \quad - 7$$

$$\begin{array}{r} 5 \overline{) 205} \\ 5 \overline{) 41} \quad - 0 \\ 5 \overline{) 8} \quad - 1 \\ 1 \quad - 3 \end{array}$$

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-2 if not consider d.c.

4. (12 points)

Design a combinational circuit that gets as its input one decimal digit X encoded by 4-bit binary codes, x_3, x_2, x_1, x_0 and indicates one of three conditions:

1. If $X < 5$, the red light goes on ($r = 1$), and the green light goes off ($g = 0$);
2. If $X > 5$, the green light goes on ($g = 1$), and the red light goes off ($r = 0$);
3. If $X = 5$, both lights go on.

Find out the specifications of the combinational circuit by filling in the following 2-D function table: write values of r and g in each cell with the order (r, g) , and use "-" for "don't care".

x_3x_2	x_1x_0			
	00	01	10	11
00	10	10	10	10
01	10	11	01	01
10	01	01	-	-
11	-	-	-	-

Show all your work below for the credit:

x_3	x_2	x_1	x_0	r	g
0	0	0	0	1	0
0	0	0	1	1	0
0	0	1	0	1	0
0	0	1	1	1	0
0	1	0	0	1	0
0	1	0	1	1	1
0	1	1	0	0	1
0	1	1	1	0	1
1	0	0	0	0	1
1	0	0	1	0	1
1	0	1	0	-	-
1	0	1	1	-	-
1	1	1	1	-	-

} dc

End of Quiz #1