OL Academy

ITCS110/CSC103

Computer Programming
for Scientists and Engineers

Exam1

Midterm Exam Revision

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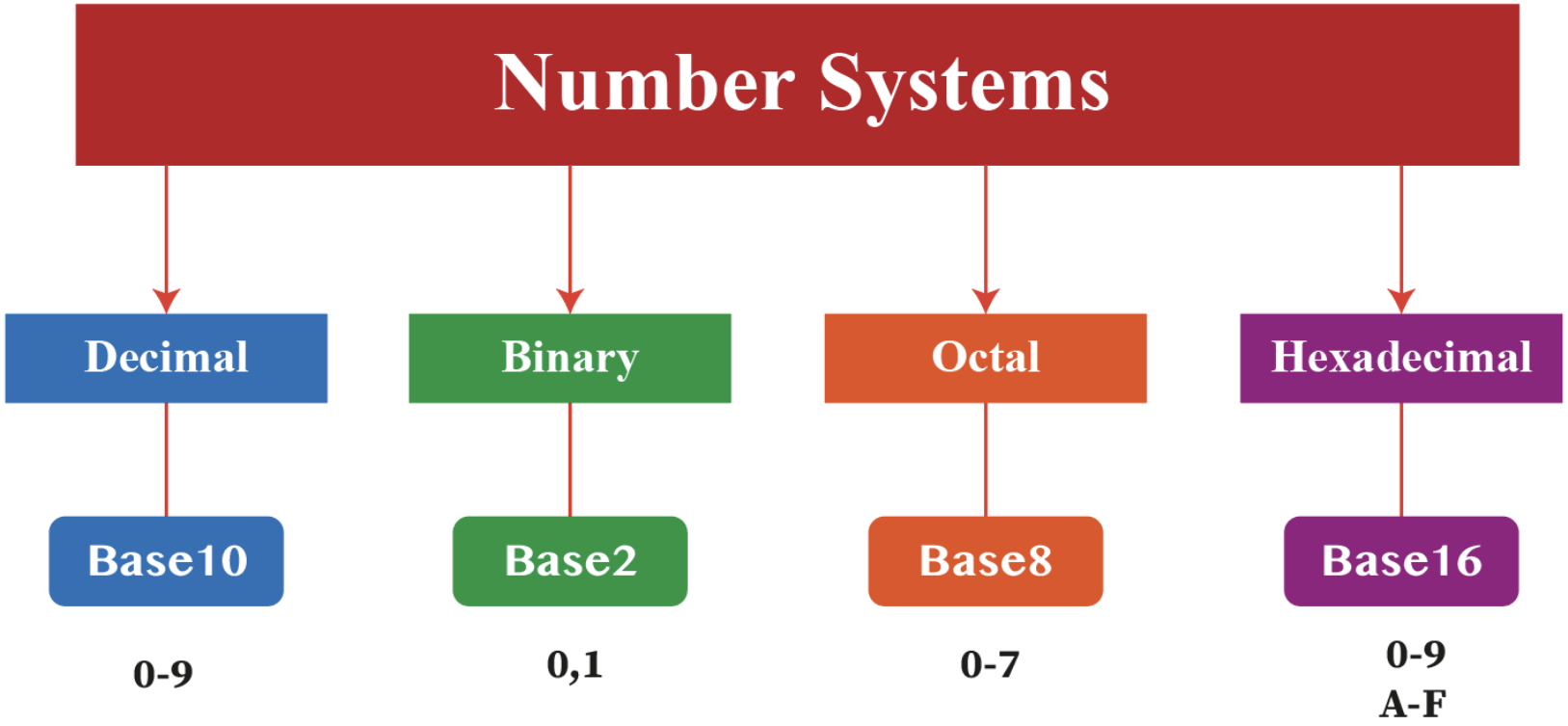
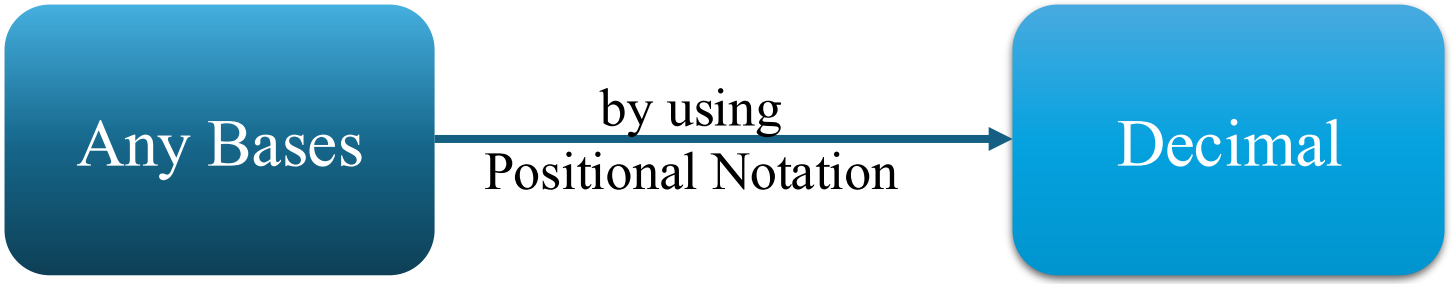
Exam 1

First Semester, 2023/2024


Number Systems
Decimal
Binary
Octal
Hexadecimal
Base10
Base2
Base8
Base16
0-9
0,1
0-7
0-9
A-F

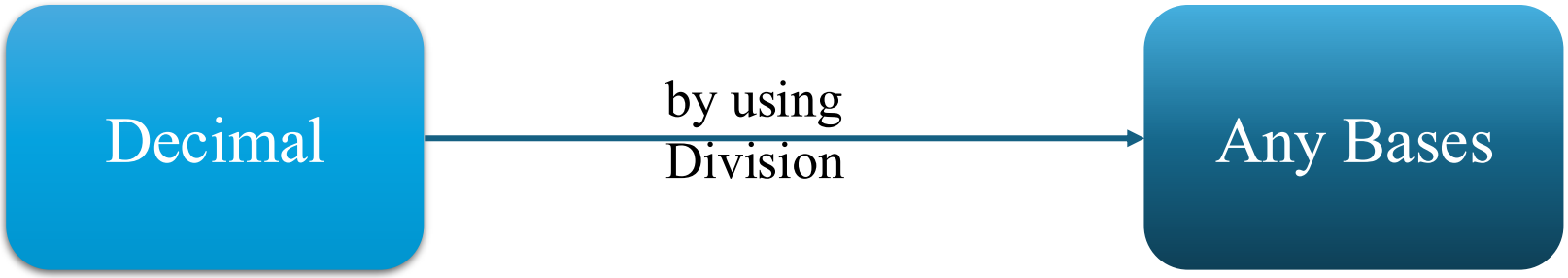


Binary to Decimal Multiply 2^n

Octal to Decimal Multiply 8^n

Hexadecimal to Decimal Multiply 16^n

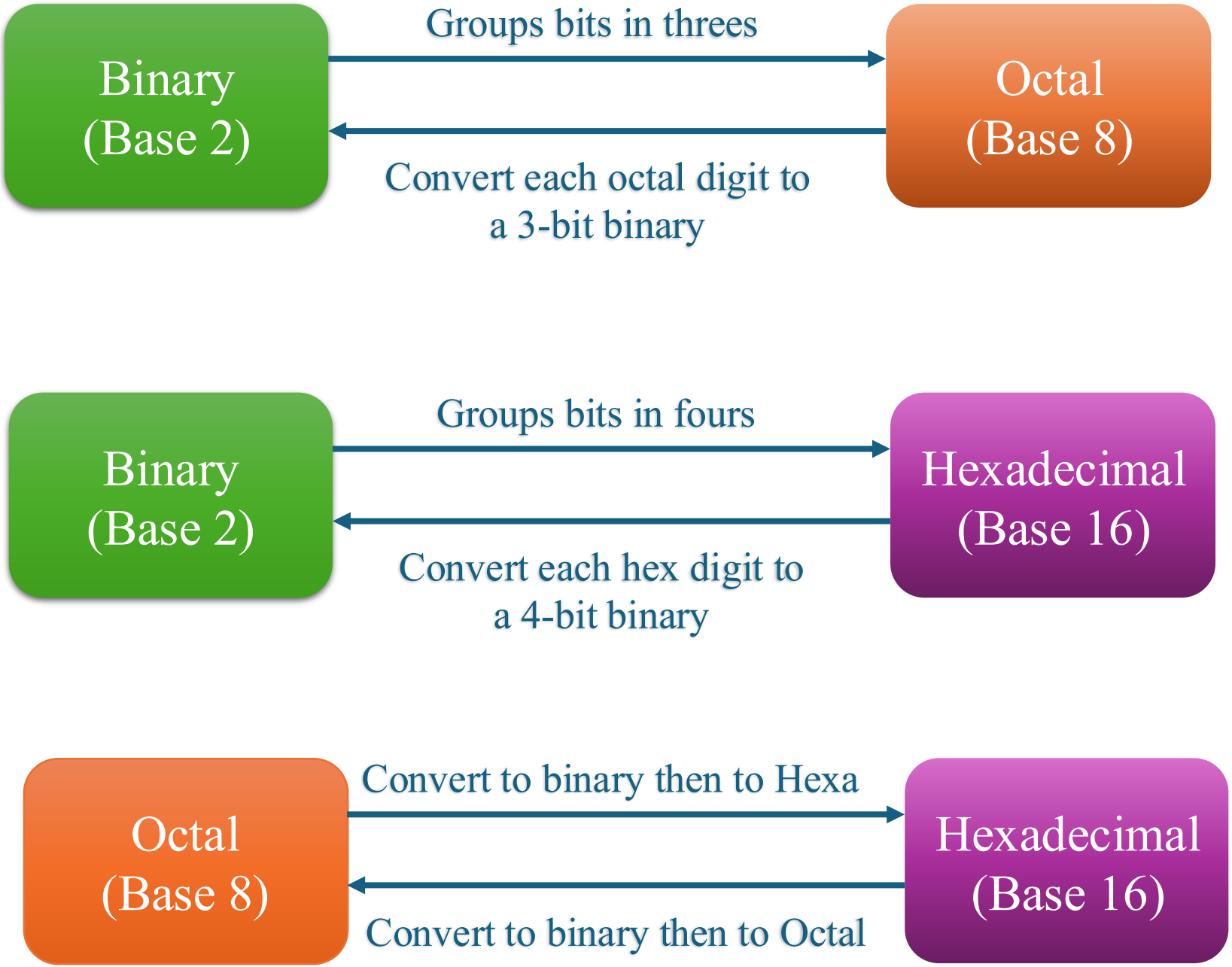
Where *n* is the "weight" of the bit



Decimal to Binary — Divide by 2

Decimal to Octal — Divide by 8

Decimal to Hexadecimal — Divide by 16


Binary
(Base 2)
Groups bits in threes
Octal
(Base 8)
Convert each octal digit to
a 3-bit binary
Binary
(Base 2)
Groups bits in fours
Hexadecimal
(Base 16)
Convert each hex digit to
a 4-bit binary
Octal
(Base 8)
Convert to binary then to Hexa
Hexadecimal
(Base 16)
Convert to binary then to Octal

Binary Addition

0	+	0	=	0
0	+	1	=	1
1	+	0	=	1
1	+	1	=	10

Binary Multiplication

0	×	0	=	0
0	×	1	=	0
1	×	0	=	0
1	×	1	=	1

QUESTION #1:

Part A: Perform the following and **show your detailed steps**

1. $(7d4e)_{16} = (\qquad\qquad\qquad\qquad\qquad\qquad)_2$

2 $(256)_8 = (\qquad\qquad\qquad\qquad\qquad\qquad)_{10}$

3 $(101101)_2 * (101)_2 = (\quad)_2$

Part B: Draw a flowchart that prompts the user to enter from the keyboard a letter ***let*** ('R' or 'r', 'C' or 'c' representing a rectangle/cylinder) and two numbers (*t1* and *t2*), and calculates ***rst*** as follows.

$$\textbf{rst} = \begin{cases} t1 + t2 & if\ let = 'C' or\ 'c' \\ 2\ x\ \pi\ x\ t1\ x\ (t1 + t2) & if\ let = 'R' or\ 'r' \\ prints\ an\ error\ message\ "Invalid\ input"\ and\ quit & otherwise \end{cases}$$

If the user enters any other character, then prints an error message "Invalid input.". Then prints the entered values and the value of **rst.**

QUESTION #2:

Part #A: Choose the best correct answer.

1 A manipulator required to display a floating-point number with 3 decimal places is:

(a) setprecision(3)

(b) cmath(3)

(c) setw(3)

(d) setfill(3)

(e) None

QUESTION #2:

Part #A: Choose the best correct answer.

2 A statement that defines a variable var used to store one character equals to ‘Y’ or ‘N’ is:

(a) int var;

(b) char var;

(c) double var;

(d) bool var;

(e) None

QUESTION #2:

Part #A: Choose the best correct answer.

3 For the input line: *12.59 75.36 77.66,* What will be in *t2,t3,t4* variables after executing the following C++ code?

```
int t4 ; double t2,t3; cin >> t4 >> t3 >> t2 ;
```

(a) t4=1 t3=2.59 t2=75.36

(b) t4=12.59 t3=75.36 t2=77.66

(c) t4=12 t3=59 t2=75.36

(d) t4=12 t3=0.59 t2= 75.36

(e) None

QUESTION #2:

Part #B: output

(a) What will be printed after executing the following C++ code? Show the exact output.

int x=4, y=5, z=8, w; double f;
y *= z;
cout <<"Y = " << y << endl;
w = x - 32 / z * (x - 17 / z);
cout<<"W = " << w << endl;
cout<<"F = "<< x-17.5/z*x-14.0/z << endl;
	OUTPUT:

QUESTION #2:

Part #B: output

(b) What will be printed after executing the following C++ code? Show the exact output.

`double x=54.70, y=66.789, w= -99.128;`
`cout <<"X =" << setfill('!')<<setw(8)<< x <<'\n';`
`cout << fixed << setprecision(2)<< setfill('#');`
`cout <<"Y ="<<setw(9)<< y<<setprecision(2)<<'\n';`
`cout <<"W ="<<setfill('*') << setw(10)<< w<<endl;`
`cout << "BW =" << left << setw(8)<< w << endl;`
	OUTPUT:

QUESTION #3:

Part #A: Choose the best correct answer

A

```
int n=7;
switch (n)
{    case 5: cout << "123" << "&&&";break;
     case 6: cout << "def" << "???";
     case 7: cout << "abc" << "???";
     case 8: cout << "456" << "***";break;
     default: cout << "999" << "+++";
}
cout << "Nice Test\n" ;
```

a) 456***999+++Nice Test\n

b) def???abc???Nice Test

c) abc???456***Nice Test

d) 456***999+++Nice Test

e) None

QUESTION #3:

Part #A: Choose the best correct answer

B

```
float x=4.5, y=6.75;
cout << "Result is ";
if (x > y)
    cout << 2*y-x << '\t';
else
    cout << 2*y+x << '\t';
cout << "CSC_UOB\n ";
```

a) Result is -2.25 UOB_CSC103

b) Result is -2.25 CSC_UOB

c) Result is 18 CSC_UOB

d) Result is -2.25 UOB_CSC103\n

e) None

Part #B: Write a C++ program that prompts the user to enter from the KBD 3 values about an employee: The basic salary in BDs (double), the overtime hours worked (integer), and an employee rank (char) used to define the hourly rate as shown in the table below.

Employee Rank	A	B	C	D
Hourly Rate in BDs	12.000	9.750	7.500	5.250

The monthly salary 0n BDs is calculated as follows:

monthly salary= basic salary+ overtime hours worked * hourly rate

Your program should print the entered values and the calculated monthly salary as shown below

Sample RUN

```
Enter 3 values (double, integer, char)please: 650.0 16 C
Basic salary: 650.000
Overtime hours worked: 16
Employee rank: C
Hourly rate: 7.500
Your monthly Salary = 770.000
```

QUESTION #4:

Part #A: Choose the best correct answer

int j=12;
while (j >= 8)
{
cout << 2 * j ;
j-= 2 ;
}
	a) 162024
	b) 242220
	c) 242016
	d) 202224
	e) None

Part #B: A company organizes a charity campaign for helping Gaza children. Every person can denote one or more banknotes in the donation box. Banknotes are of 3 colors: blue (5 BD), green (10 BD), and brown (20 BD). The box capacity is up to **4000** banknotes. Write a C++ program that, at the campaign end, prompts the user to enter from KBD the color of each banknote in the box ('**B**' for blue, '**G**' for green, '**W**' for brown), counts the number of blue (**countB**) , green (**countG**) , and brown (**countW**) banknotes, calculates the **total** amount collected as follows:

$$total = 5 \times countB + 10 \times countG + 20 \times countW$$

Note: Your program should produce and format the output as shown below.

Sample RUN

```
Enter the next banknote color (B,G, or W) please: B
Enter the next banknote color (B,G, or W) please: W
...
...
Enter the next banknote color (B,G, or W) please: B
Enter the next banknote color (B,G, or W) please: G
The number of blue banknotes = 1000
The number of green banknotes = 1500
The number of brown banknotes = 1500
The total amount collected = 50000
```