



FACULTY OF MANAGEMENT AND ADMINISTRATION

COURSE TITLE: CSC 310-INTERMEDIATE PROGRAMMING

SEMESTER 2: FINAL EXAMINATION – NOVEMBER, 2014

LECTURER: MR T. MAKAMBWA

TIME: 3 HOURS

INSTRUCTIONS

Answer *all* Questions in Section A and any *three* questions from Section B

All codes should be in Java Programming Language

Total possible mark is 100

Start **each** question on a new page in your answer Booklet.

The marks allocated to **each** question are shown at the end of the section.

Show all your workings.

Credit will be awarded for logical, systematic and neat presentations.

Section A(40 Marks)

Answer *all* questions in this section

Question One

- a) (**Health application: computing BMI**) Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. Write a program that prompts the user to enter a weight in pounds and height in inches and display the BMI. Note that one pound is **0.45359237** kilograms and one inch is **0.0254** meters. **(10 Marks)**
- b) (**Financial application: calculating interest**) If you know the balance and the annual percentage interest rate, you can compute the interest on the next monthly payment using the following formula: $\text{interest} = \text{balance} * (\text{annualInterestRate} / 1200)$ Write a program that reads the balance and the annual percentage interest rate and displays the interest for the next month in two versions: (a) Use dialog boxes to obtain input and display output; (b) Use console input and output. **(10 Marks)**

Question Two

- a) (**Computing the volume of a cylinder**) Write a program that reads in the radius and length of a cylinder and computes volume using the following formulas:
 $\text{area} = \text{radius} * \text{radius} * \pi$
 $\text{Volume} = \text{area} * \text{length}$
(10 Marks)
- b) (**Science: calculating energy**) Write a program that calculates the energy needed to heat water from an initial temperature to a final temperature. Your program should prompt the user to enter the amount of water in kilograms and the initial and final temperatures of the water. The formula to compute the energy is: $Q = M * (\text{final temperature} - \text{initial temperature}) * 4184$ where **M** is the weights of water in kilograms, temperatures are in degrees Celsius, and energy **Q** is measured in joules. **(10 Marks)**

Section B (60 Marks)

Answer any *three* questions from this Section

Question Three

(a) The price of a plane ticket is 1000\$ by default, but discounts are applied to it based on different criteria. The following rules determine the discount, and hence the final price:

- Students get 20% discount.
- People who purchase in 30 days in advance get 25% discount.

Discount can aggregate, for example a student purchasing 40 days in advance gets a 40% discount. You have to ask the user for input on whether they are a student. Draw a flowchart of your algorithm that solves the following problem and calculates the final price. **(10 Marks)**

(b) Convert the flowchart into the pseudo code. **(10 Marks)**

Question Four

- a) Find Maximum of 2 numbers. **(10 Marks)**
- b) Write a program to find whether given number is **Armstrong** or not.

(10 Marks)

Example:

Input - 153

Output - $1^3 + 5^3 + 3^3 = 153$, so it is **Armstrong** number.

Question Five

a) Write a program to Find whether number is **Prime** or Not. (10 Marks)

b) Write a program to find whether number is **Palindrome** or not.(10 Marks)

Example:

Input - 12521 is a **Palindrome** number

Input - 12345 is not a **Palindrome** number

Question Six

a) Write a program to generate **Harmonic** Series. (10 Marks)

Example :

Input - 5

Output - $1 + 1/2 + 1/3 + 1/4 + 1/5 = 2.28$ (Approximately)

b) Write a program to find average of consecutive N Odd numbers and Even numbers

(10 Marks)

Question Seven

a) Write a program to reverse a given number. (10 Marks)

b) (**Converting Celsius to Fahrenheit**) Write a program that reads a Celsius degree in double from the console then converts it to Fahrenheit and displays the result. The formula for the conversion is as follows: **Fahrenheit = (9 / 5) * Celsius + 32**

Hint: In Java, **9 / 5** is **1**, but **9.0 / 5** is **1.8**.

(10 Marks)

Question Eight

Foo Corporation needs a program to calculate how much to pay their hourly employees. The US Department of Labor requires that employees get paid time and a half for any hours over 40 that they work in a single week. For example, if an employee works 45 hours, they get 5 hours of overtime, at 1.5 times their base pay. The State of Massachusetts requires that hourly employees be paid at least \$8.00 an hour. Foo Corp requires that an employee not work more than 60 hours in a week.

- An employee gets paid (hours worked) \times (base pay), for each hour up to 40 hours.
- For every hour over 40, they get overtime = (base pay) \times 1.5.
- The base pay must not be less than the minimum wage (\$8.00 an hour). If it is, print an error.
- If the number of hours is greater than 60, print an error message.

Create a new class called FooCorporation. Write a method that takes the base pay and hours worked as parameters, and prints the total pay or an error. Write a main method that calls this method for each of these employees:

	<u>Base Pay</u>	<u>Hours Worked</u>
Employee 1	\$7.50	35
Employee 2	\$8.20	47
Employee 3	\$10.00	73

(20 Marks)

Question Nine

a) Write a program to find **Factorial** of Given number

(10 Marks)

b) Write a program to find **Fibonacci** series of a given number

(10 Marks)

Eg Input 8

Output 1 1 2 3 5 8 13 21

Question Ten

a) Find Minimum of 2 numbers using conditional operator

(10 Marks)

b) Write a program to find SUM AND PRODUCT of a given Digit.

(10 Marks)

END OF PAPER