**Hong Kong Institute of Vocational Education**

**IT114105 HD in Software Engineering**

**IT124106 HD in Computer Systems Administration**

**ITP3914 Programming**

**Topic 3: Basic Program Structures**

# **Lab 9 – Methods and Parameter Passing**

Exercise 1

Show the output of the following programs.

(a)

public class Q1a {  
 public static void main( String[] args ) {  
 question();  
 answer();  
 }  
  
 public static void answer() {  
 System.out.println("javac.exe");  
 }  
  
 public static void question() {  
 System.out.println("What is the command to compile a Java program?");  
 }  
}

What is the command to compile a Java program?

javac.exe

(b)

public class Q1b {  
 public static void main( String[] args ) {  
 firstName("Peter");  
 }  
  
 public static void firstName( String Name ) {  
 System.out.println("Call me " + Name + "." );  
 }  
}

Call me Peter.

(c)

public class Q1c {  
 public static void main( String[] args ) {  
 potato( 1 );  
 potato( 2 );  
 potato( 3 );  
 }  
  
 public static void potato( int Quantity ) {  
 System.out.println(Quantity + " potato");  
 }  
}

1 potato

2 potato

3 potato

(d)

public class Q1d {  
 public static void main( String[] args ) {  
 characterType( 'A' );  
 characterType( 'z' );  
 characterType( '5' );  
 }  
  
 public static void characterType( char ch ) {  
 System.out.print( "'" + ch + "' is a " );  
 if ( ( ch >= 'A' ) && ( ch <= 'Z' ) )  
 System.out.println( "upper-case letter." );  
 else if ( ( ch >= 'a' ) && ( ch <= 'z' ) )  
 System.out.println( "lower-case letter." );  
 else if ( ( ch >= '0' ) && ( ch <= '9' ) )  
 System.out.println( "digit." );  
 }  
}

upper-case letter.

lower-case letter.

digit.

Exercise 2

Show the output of the following programs.

(a)

public class Q2a {  
 public static void main( String[] args ) {  
 double acres = 5;  
 System.out.println( "You can park about " + cars(acres)+ " cars." );  
 }  
  
 public static double cars( double x ) {  
 return 100 \* x;  
 }  
}

You can park about 500 cars.

(b)

public class Q2b {  
 public static void main( String[] args ) {  
 double r = 1; // Radius of the base of a cylinder  
 double h = 2; // Height of a cylinder  
 displayVolume( r, h ); // 1 , 2  
 r = 3;  
 h = 4;  
 displayVolume( r, h );  
 }  
  
 public static double area( double r ) {  
 return 3.14159 \* r \* r;  
 }  
  
 public static void displayVolume( double r, double h ) {  
 System.out.println("Volume of cylinder having base area " + area(r) +  
 " and height " + h + " is " + ( h \* area(r) ) + "." );  
 }  
}

Volume of cylinder having base area 3.14159 and height 2.0 is 6.28318.

Volume of cylinder having base area 28.27431 and height 4 is 113.09724.

(c)

public class Q2c {  
 public static void main( String[] args ) {  
 System.out.println( "The maximum is " + max4( 2.3, 4.9, -5.1, 0.0 ) );  
 }  
  
 public static double max2( double a, double b ) {  
 return ( a > b ) ? a : b;  
 }  
  
 public static double max4( double a, double b, double c, double d ) {  
 return max2( max2( a, b ), max2( c, d ) );  
 }  
}

The maximum is 4.9

Exercise 3 – Programming Exercise

Complete the method countDown() in the program below. The program allows the users to enter an integer value and prints the counting down of the integer. Example executions are shown below. User inputs are highlighted in ***bold italics***.

c:\> java CountDown

? ***3***

3 2 1

c:\> java CountDown

? ***5***

5 4 3 2 1

import java.util.\*;

public class CountDown {

public static void main(String [] args) {

Scanner kb = new Scanner(System.in);

System.out.print("? ");

int num = kb.nextInt();

countDown(num);

}

public static void countDown(int num) {

if (!(num == 0)) {

System.out.print(num+ " ");

countDown(num - 1);

}

}

}

Exercise 4 – Programming Exercise

**Ideal Age of Wife**: According to Plato, a man should marry a woman whose age is half his age plus seven years. Write a Java program that requests a man’s age as input. The main() method then calls a method idealAge(), passing the man’s age as argument. The method then returns to the ideal age of his wife for the main() method to print on the screen. The program skeleton is shown below.

import java.util.Scanner;

public class IdealAge {

public static void main(String [] args) {

Scanner kb = new Scanner(System.in);

int manAge = kb.nextInt();

int wifeAge;

// call idealAge() with manAge as argument

System.out.println("Ideal age of wife = " + wifeAge);

}

public static int idealAge(int manAge) {

return (manAge/2)+7;

}

}

Exercise 5 – Programming Exercise

Write a Java program to let users enter an integer. The integer is then passed to a boolean method as argument. The method checks if the integer is divisible by 7. Return true if so, and false otherwise. Test you method by developing a complete Java program and calling the method from main().

import java.util.Scanner;

public class DivisibleBy7 {

public static void main(String[] args) {

Scanner kb = new Scanner(System.in);

System.out.print("? ");

int num = kb.nextInt();

if (isDivisibleBy7(num)) // call isDivisibleBy7() with num as argument

System.out.println(num + " is divisible by 7");

else

System.out.println(num + " is not divisible by 7");

}

public static boolean isDivisibleBy7(int num) {

return num % 7 == 0;

}

}

Exercise 6 – Programming Exercise

Write a Java program to let users enter the three sides of a triangle. The three sides are then passed to a boolean method as argument. The method checks if it the triangle is right-angled by using the Pythagorean Theorem *a2 + b2 = c2*. Test you method by developing a complete Java program and calling the method from main().

Exercise 7 – Programming Exercise

**Fibonacci Series**: An element in the Fibonacci Series is the sum of its previous two integers with the first two elements in the series defined as 1.

The series is thus, 1, 1, 2, 3, 5, 8, 13, 21, …

Complete the Java program below which prints the Fibonacci Series with the number of terms specified by the user. Example executions are shown below. User inputs are highlighted in ***bold italics***.

c:\> java Fib

? ***1***

1

c:\> java Fib

? ***2***

1, 1

c:\> java Fib

? ***10***

1, 1, 2, 3, 5, 8, 13, 21, 34, 55

import java.util.\*;

public class Fib {

public static void main(String[] args) {

Scanner kb = new Scanner(System.in);

System.out.print("? ");

int num = kb.nextInt();

// call printFib() with num as argument

printFib(num);

}

public static void printFib(int num) {

if (num == 1) {

System.out.println("1");

} else if (num == 2) {

System.out.println("1, 1");

} else {

String fibString = "";

int[] fib = new int[num + 1];

fib[0] = 1;

fib[1] = 1;

for (int i = 2; i < num; i++) {

fib[i] = fib[i - 1] + fib[i - 2];

}

for (int i = 0;i < fib.length-1;i++){

fibString += fib[i] + "";

if (i != fib.length-2){

fibString += ",";

}

}

System.out.print(fibString);

}

} }

Exercise 8 – Programming Exercise

In Lab 8 Exercise 5 (b), you have developed a Java program to print 20 prime numbers on screen. You are now required to enhance the functionality of the program.

* Move the program logic for checking whether a number is prime to a boolean method isPrime(). The method receives the integer to be checked as a parameter.
* Modify the program so that users are allowed to enter the integer to be checked during runtime.
* NOTE: The new program does not need to find 20 prime numbers, thus the program logic is much more simple.

Example executions are shown below. User inputs are highlighted in ***bold italics***.

c:\> java CheckPrime

? ***6***

6 is not a prime number

c:\> java CheckPrime

? ***11***

11 is a prime number

**END.**