

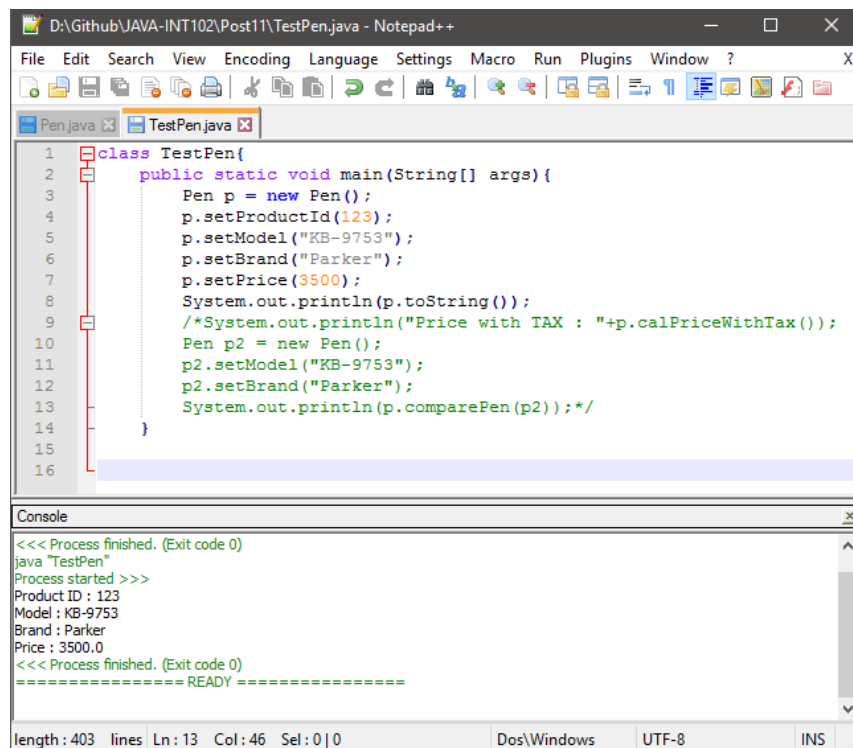
#Post7

1. สร้าง class ปากกา ตาม UML ด้านล่าง พร้อมทดสอบ method ทุกตัว ใน Driver Class พร้อมเรียก method toString() ทั้ง 2 รูปแบบ

Pen
-productId : long <<(eg 123) -model : String -brand : String -price : double <<(eg. 29.00, 96.00)
+setProductId(long pid) : void +getProductId() : long +setModel(String penModel) : void +getModel() : String +setBrand(String penBrand) : void +getBrand() : String +setPrice(double penPrice) : void +getPrice() : double +toString() : String

```

D:\Github\JAVA-INT102\Post11\Pen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ? X
Pen.java TestPen.java
1 class Pen{
2     private long productId;
3     private String model;
4     private String brand;
5     private double price;
6
7     public void setProductId(long pid){
8         productId=pid;
9     }
10    public long getProductId(){
11        return productId;
12    }
13
14    public void setModel(String penModel){
15        model=penModel;
16    }
17    public String getModel(){
18        return model;
19    }
20
21    public void setBrand(String penBrand){
22        brand=penBrand;
23    }
24    public String getBrand(){
25        return brand;
26    }
27
28    public void setPrice(double penPrice){
29        price=penPrice;
30    }
31    public double getPrice(){
32        return price;
33    }
34
35    public String toString(){
36        return "Product ID : "+productId+
37            "\nModel : "+model+
38            "\nBrand : "+brand+
39            "\nPrice : "+price;
40    }
41 }
42
  
```



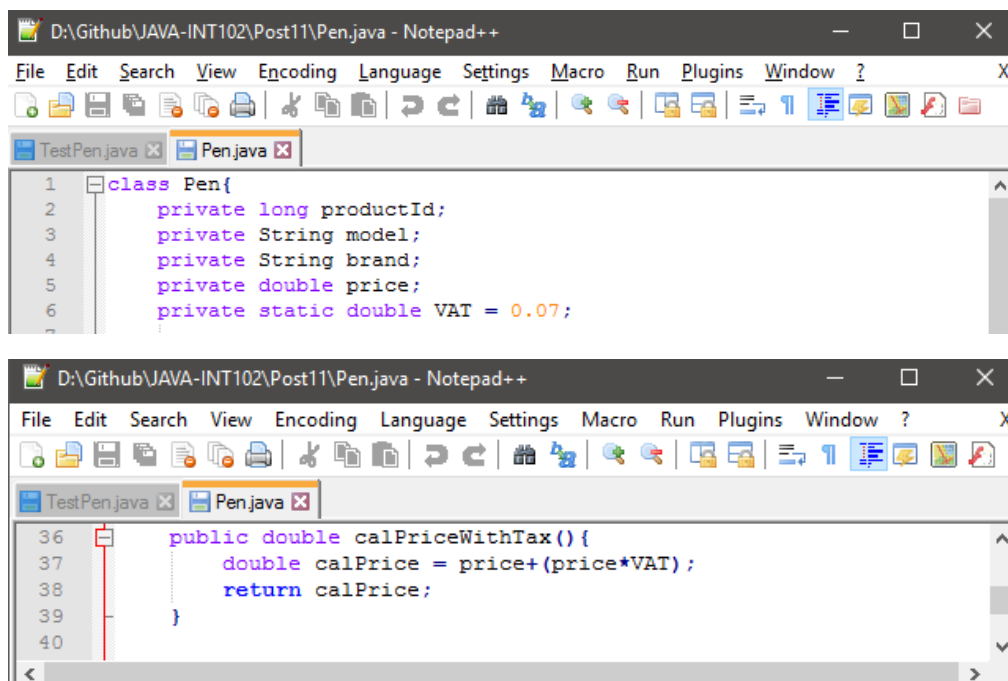
The screenshot shows a Notepad++ window with the file `D:\Github\JAVA-INT102\Post11\TestPen.java`. The code defines a `TestPen` class with a `main` method. The `main` method creates a `Pen` object, sets its attributes, prints its string representation, calculates the price with tax, and compares it with another `Pen` object. The console output shows the execution results, including the product ID, model, brand, price, and the calculated price with tax.

```
1 class TestPen{
2     public static void main(String[] args){
3         Pen p = new Pen();
4         p.setProductId(123);
5         p.setModel("KB-9753");
6         p.setBrand("Parker");
7         p.setPrice(3500);
8         System.out.println(p.toString());
9         /*System.out.println("Price with TAX : "+p.calPriceWithTax());*/
10        Pen p2 = new Pen();
11        p2.setModel("KB-9753");
12        p2.setBrand("Parker");
13        System.out.println(p.comparePen(p2));*/
14    }
15
16 }
```

Console Output:

```
<<< Process finished. (Exit code 0)
java "TestPen"
Process started >>>
Product ID : 123
Model : KB-9753
Brand : Parker
Price : 3500.0
<<< Process finished. (Exit code 0)
===== READY =====
```

2. เพิ่ม static variable ชื่อ VAT เพื่อกำหนดค่า VAT ในที่นี้คือ 7% จากนั้นสร้าง method ชื่อ `calPriceWithTax()` โดยคืนค่าเป็นสินค้าที่เพิ่ม VAT ลงไปแล้วเป็นทศนิยม 3 ตำแหน่ง พร้อมทดสอบใน Driver Class



The screenshot shows a Notepad++ window with the file `D:\Github\JAVA-INT102\Post11\Pen.java`. The code defines a `Pen` class with private variables for `productId`, `model`, `brand`, `price`, and a static `VAT` variable. The `calPriceWithTax()` method is implemented to calculate the price with tax and return it.

```
1 class Pen{
2     private long productId;
3     private String model;
4     private String brand;
5     private double price;
6     private static double VAT = 0.07;
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36     public double calPriceWithTax(){
37         double calPrice = price+(price*VAT);
38         return calPrice;
39     }
40 }
```

```
*D:\Github\JAVA-INT102\Post11\TestPen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ? X

TestPen.java Pen.java
1 class TestPen{
2     public static void main(String[] args){
3         Pen p = new Pen();
4         p.setProductId(123);
5         p.setModel("KB-9753");
6         p.setBrand("Parker");
7         p.setPrice(3500);
8         System.out.println(p.toString());
9         System.out.println("Price with TAX : "+p.calPriceWithTax());
10        /*Pen p2 = new Pen();
11        p2.setModel("KB-9753");
12        p2.setBrand("Parker");
13        System.out.println(p.comparePen(p2));*/
14    }
15 }
16

Console
java "TestPen"
Process started >>>
Product ID : 123
Model : KB-9753
Brand : Parker
Price : 3500.0
Price with TAX : 3745.0
<<< Process finished. (Exit code 0)
===== READY =====

length: 405 lines Ln: 16 Col: 1 Sel: 0 | 0 Dos\Windows UTF-8 INS
```

3. เพิ่ม method เพื่อเปรียบเทียบกับปากกาอีกด้ามว่าเป็น brand เดียวกันไหม ถ้าใช่ ตรวจสอบว่าเป็น model เดียวกันไหม มี method header คือ public String comparePen(Pen a) ถ้า brand ต่างกันไม่จำเป็นต้องเปรียบเทียบ model

RESULT_EX 1:

```
Pen a = new Pen();
a.setModel("GP10245");
a.setBrand("pentel");

Pen b = new Pen ();
b.setModel("GP10245");
b.setBrand("pentel");

System.out.print(a.comparePen(b));//แสดงเป็น "same Brand same Model"
```

RESULT_EX 2:

```
Pen a = new Pen();
a.setModel("GP145");

a.setBrand("pentel");

Pen b = new Pen ();
b.setModel("GP10245");
b.setBrand("pentel");

System.out.print(a.comparePen(b));//แสดงเป็น "same Brand difference Model"
```

RESULT_EX 3:

```
Pen a = new Pen();
a.setModel("GP145");
a.setBrand("parker");

Pen b = new Pen ();
b.setModel("GP10245");
b.setBrand("pentel");

System.out.print(a.comparePen(b));//แสดงเป็น "difference Brand"
```

```
D:\Github\JAVA-INT102\Post11\Pen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ? X
TestPen.java Pen.java
41 public String comparePen(Pen a){
42     if(brand.equalsIgnoreCase(a.brand)){
43         if(model.equalsIgnoreCase(a.model)){
44             return "same Brand same Model";
45         }
46         else
47             return "same Brand difference Model";
48     }
49     else
50         return "difference Brand";
51 }
```

```
D:\Github\JAVA-INT102\Post11\TestPen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ? X
TestPen.java Pen.java
1 class TestPen{
2     public static void main(String[] args){
3         Pen p = new Pen();
4         //p.setProductId(123);
5         p.setModel("KB-9753");
6         p.setBrand("Parker");
7         /*p.setPrice(3500);
8         System.out.println(p.toString());
9         System.out.println("Price with TAX : "+p.calPriceWithTax());*/
10        Pen p2 = new Pen();
11        p2.setModel("KB-9753");
12        p2.setBrand("Parker");
13        System.out.println(p.comparePen(p2));
14    }
15 }
```

```
Console
javac "TestPen.java"
Process started >>>
<<< Process finished. (Exit code 0)
java "TestPen"
Process started >>>
same Brand same Model
<<< Process finished. (Exit code 0)
===== READY =====

length: 407  ltr Ln: 16  Col: 1  Sel: 0 | 0  Dos\Windows  UTF-8  INS
```

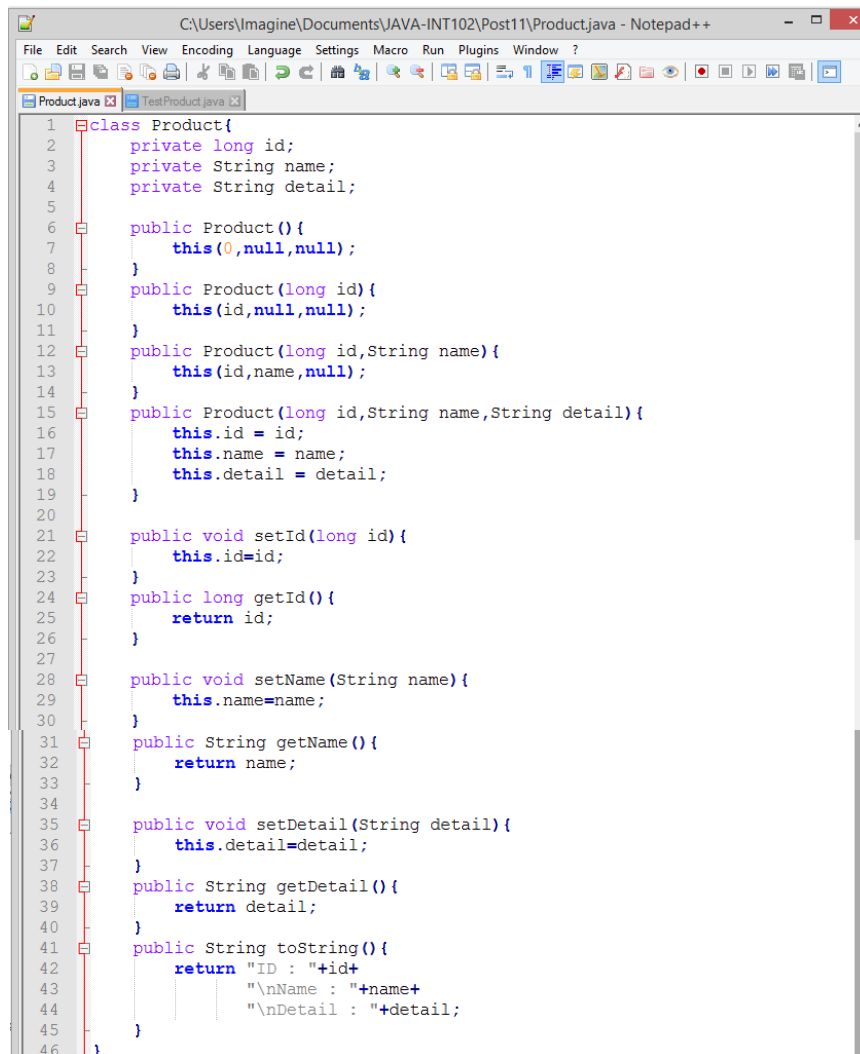
#Post 8

1. จงสร้าง Class Product

Product
-id : long -name : String -detail : String
+setId(long id) : void +getId() : long +setName(String name) : void +getName() : String +setDetail(String detail) : void +getDetail() : String

จงสร้าง constructor ดังต่อไปนี้ โดยใช้ this reference และ this constructor เป็นตัวช่วย
พร้อมทดสอบใน Driver class ทุก constructor

- + Product()
- + Product(long id)
- + Product(long id, String name)
- + Product(long id, String name, String detail)



```
1 class Product{
2     private long id;
3     private String name;
4     private String detail;
5
6     public Product(){
7         this(0,null,null);
8     }
9     public Product(long id){
10        this(id,null,null);
11    }
12    public Product(long id,String name){
13        this(id,name,null);
14    }
15    public Product(long id,String name,String detail){
16        this.id = id;
17        this.name = name;
18        this.detail = detail;
19    }
20
21    public void setId(long id){
22        this.id=id;
23    }
24    public long getId(){
25        return id;
26    }
27
28    public void setName(String name){
29        this.name=name;
30    }
31    public String getName(){
32        return name;
33    }
34
35    public void setDetail(String detail){
36        this.detail=detail;
37    }
38    public String getDetail(){
39        return detail;
40    }
41    public String toString(){
42        return "ID : "+id+
43            "\nName : "+name+
44            "\nDetail : "+detail;
45    }
46 }
```

The screenshot shows a Notepad++ window with the file `C:\Users\Imagine\Documents\JAVA-INT102\Post11\TestProduct.java` open. The code defines a `TestProduct` class with a `main` method that creates three `Product` objects and prints their string representations. The console output shows the execution of the program, displaying the details of each `Product` object: `ID : 123`, `Name : null`, `Detail : null`; `ID : 123`, `Name : Toy`, `Detail : null`; and `ID : 123`, `Name : Toy`, `Detail : Green`. The status bar at the bottom indicates the file is `TestProduct.java`, 313 characters long, 13 lines, and is using the `UTF-8` encoding.

```
1 class TestProduct{
2     public static void main(String[] args){
3         Product p1 = new Product(123);
4         System.out.println(p1.toString());
5
6         Product p2 = new Product(123,"Toy");
7         System.out.println(p2.toString());
8
9         Product p3 = new Product(123,"Toy","Green");
10        System.out.println(p3.toString());
11    }
12 }
```

Console

```
Process started >>>
<<< Process finished. (Exit code 0)
java "TestProduct"
Process started >>>
ID : 123
Name : null
Detail : null
ID : 123
Name : Toy
Detail : null
ID : 123
Name : Toy
Detail : Green
<<< Process finished. (Exit code 0)
===== RFADY =====
```

Java source file length : 313 lines : 13 Ln : 13 Col : 1 Sel : 0 | 0 Dos\Windows UTF-8 INS

2. จาก Lab#7 Class Pen

Pen
-productId : long <<(eg 123)
-model : String
-brand : String
-price : double <<(eg. 29.00, 96.00)
+setProductId(long pid) : void
+getProductId() : long
+setModel(String penModel) : void
+getModel() : String
+setBrand(String penBrand) : void
+getBrand() : String
+setPrice(double penPrice) : void
+getPrice() : double
+toString() : String

จงสร้าง constructor ดังต่อไปนี้ โดยทดสอบการใช้ this reference และ this constructor และทำการทดสอบทุก constructor ใน Driver class

- +Pen()
- +Pen(long productId)
- +Pen(long productId, String model)
- +Pen(long productId, String model, String brand)
- +Pen(long productId, String model, String brand, double price)

```

10 public Pen(){
11     this(0);
12 }
13 public Pen(long productId){
14     this(productId,null);
15 }
16 public Pen(long productId,String model){
17     this(productId,model,null);
18 }
19 public Pen(long productId,String model,String brand){
20     this(productId,model,brand,0);
21 }
22 public Pen(long productId,String model,String brand,double price){
23     this.productId=productId;
24     this.model=model;
25     this.brand=brand;
26     this.price=price;
27     count++;
28     print = print+"Pen id "+id+" model "+model+" "+brand+" "+price+"\n";
29 }

```

The screenshot shows a Notepad++ window titled "C:\Users\Imagine\Documents\JAVA-INT102\Post11\TestPen.java - Notepad++". The editor contains the following Java code:

```

1 class TestPen{
2     public static void main(String[] args){
3         /*Pen p = new Pen();
4         p.setProductId(123);
5         p.setModel("KB-9753");
6         p.setBrand("Parker");
7         p.setPrice(3500);
8         System.out.println(p.toString());
9         System.out.println("Price with TAX : "+p.calPriceWithTax());
10        Pen p2 = new Pen();
11        p2.setModel("KB-9753");
12        p2.setBrand("Parker");
13        System.out.println(p.comparePen(p2));*/
14
15        Pen p1 = new Pen(1150);
16        System.out.println(p1.toString());
17        Pen p2 = new Pen(1150,"KB-9753");
18        System.out.println(p2.toString());
19        Pen p3 = new Pen(1150,"KB-9753","Parker");
20        System.out.println(p3.toString());
21        Pen p4 = new Pen(1150,"KB-9753","Parker",3500);
22        System.out.println(p4.toString());
23    }

```

Below the editor is a console window showing the output of the program:

```

javac "TestPen.java"
Process started >>>
<<< Process finished. (Exit code 0)
java "TestPen"
Process started >>>
Product ID : 1150
Model : null
Brand : null
Price : 0.0
Product ID : 1150
Model : KB-9753
Brand : null
Price : 0.0
Product ID : 1150
Model : KB-9753
Brand : Parker
Price : 0.0
Product ID : 1150
Model : KB-9753
Brand : Parker
Price : 3500.0
<<< Process finished. (Exit code 0)
===== READY =====

```

The status bar at the bottom indicates: "Java src length: 722 lines: 25 Ln: 25 Col: 1 Sel: 0 | 0 Dos\Windows UTF-8 INS".

2.1 : จากนั้นเพิ่ม method static numberOfPen() return เป็น int เพื่อนับจำนวนวัตถุ Pen ที่มีการสร้างขึ้น

EX 1:

```
Pen pen1 = new Pen();
System.out.print(p1.numberOfPen()); // จะได้ 1 ตัว
Pen pen2 = new Pen();
System.out.print(p2.numberOfPen()); // จะได้ 2 ตัว
Pen pen3 = new Pen();
System.out.print(p3.numberOfPen()); // จะได้ 3 ตัว
```

The image shows two screenshots of a Notepad++ editor. The top screenshot displays the `Pen.java` file, which defines a `Pen` class with private attributes for `productId`, `model`, `brand`, `price`, a static `VAT` of 0.07, a static `count`, and a static `print` string. It includes several constructors and a `numberOfPen()` static method that returns the `count`. The bottom screenshot shows the `TestPen.java` file, which contains a `TestPen` class with a `main` method. This method creates four `Pen` objects, sets their attributes, and prints the output of `numberOfPen()` for each, which should be 1, 2, 3, and 4 respectively. Below the code, the console output is visible, showing the execution of the program and the final count of 4.

```
C:\Users\Imagine\Documents\JAVA-INT102\Post11\Pen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
Pen.java TestPen.java
1 class Pen{
2     private long productId;
3     private String model;
4     private String brand;
5     private double price;
6     private static double VAT = 0.07;
7     private static int count;
8     private static String print;
9
10    public Pen() {
11        this();
12    }
13    public Pen(long productId) {
14        this(productId, null);
15    }
16    public Pen(long productId, String model) {
17        this(productId, model, null);
18    }
19    public Pen(long productId, String model, String brand) {
20        this(productId, model, brand, 0);
21    }
22    public Pen(long productId, String model, String brand, double price) {
23        this.productId=productId;
24        this.model=model;
25        this.brand=brand;
26        this.price=price;
27        count++;
28        print=print+"Pen ID : "+productId+" Model : "+model+" Brand :
29    }
30
31    public static int numberOfPen() {
32        return count;
33    }
34
C:\Users\Imagine\Documents\JAVA-INT102\Post11\TestPen.java - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
Pen.java TestPen.java
1 class TestPen{
2     public static void main(String[] args){
3         /*Pen p = new Pen();
4         p.setProductId(123);
5         p.setModel("KB-9753");
6         p.setBrand("Parker");
7         p.setPrice(3500);
8         System.out.println(p.toString());
9         System.out.println("Price with TAX : "+p.calPriceWithTax());
10        Pen p2 = new Pen();
11        p2.setModel("KB-9753");
12        p2.setBrand("Parker");
13        System.out.println(p.comparePen(p2));*/
14        Pen p1 = new Pen();
15        System.out.println("Pen : "+p1.numberOfPen());
16        Pen p2 = new Pen();
17        System.out.println("Pen : "+p2.numberOfPen());
18        Pen p3 = new Pen();
19        System.out.println("Pen : "+p3.numberOfPen());
20        Pen p4 = new Pen();
21        System.out.println("Pen : "+p4.numberOfPen());
22    }
23
Console
javac "TestPen.java"
Process started >>>
<<< Process finished. (Exit code 0)
java "TestPen"
Process started >>>
Pen : 1
Pen : 2
Pen : 3
Pen : 4
<<< Process finished. (Exit code 0)
===== READY =====
Java src length : 697 lines : 24 Ln : 21 Col : 37 Sel : 0|0 Dos\Windows UTF-8 INS
```


2.2: เพิ่ม method allPens() โดยกำหนดให้เป็น static method ทำการ return เป็น String

ของ id , model , brand, price ของวัตถุปากกาทุกแห่งที่สร้างขึ้น

EX 1:

```
Pen pen1 = new Pen(1, "001", "pentil", 200);
```

```
Pen pen2 = new Pen(2, "075", "WanPen", 100);
```

```
Pen pen3 = new Pen(3, "089", "DuanPen", 60);
```

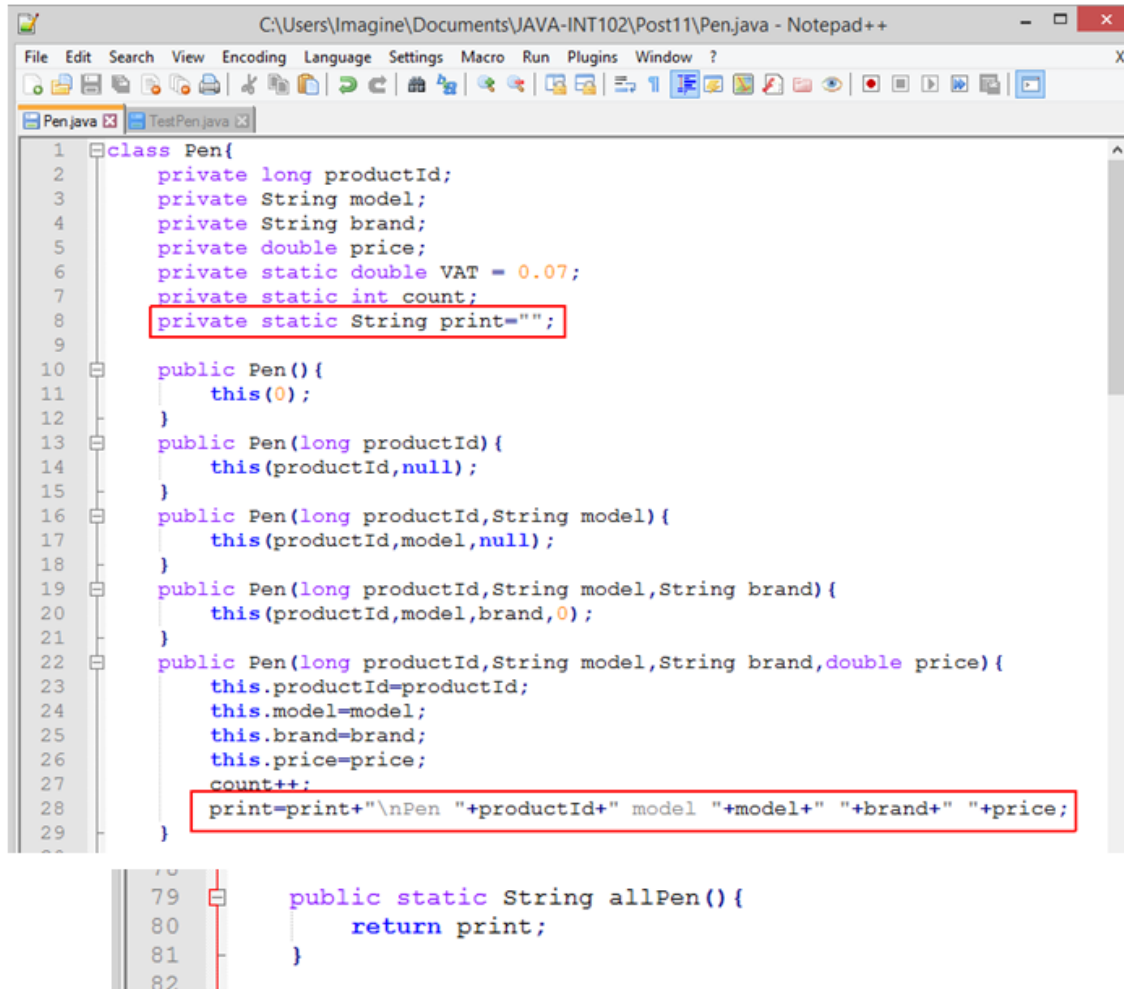
```
System.out.print(Pen.allPens());
```

```
//จะได้
```

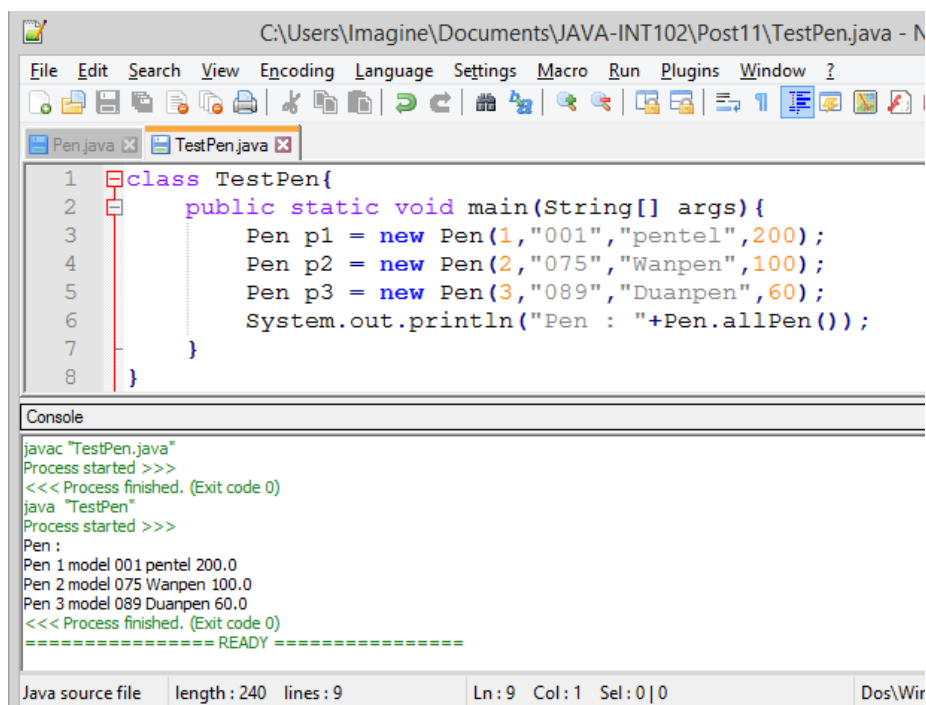
```
Pen id 1 model 001 pentil 200
```

```
Pen id 2 model 075 WanPen 100
```

```
Pen id 3 model 089 DuanPen 60
```



```
1 class Pen{
2     private long productId;
3     private String model;
4     private String brand;
5     private double price;
6     private static double VAT = 0.07;
7     private static int count;
8     private static String print="";
9
10    public Pen(){
11        this(0);
12    }
13    public Pen(long productId){
14        this(productId,null);
15    }
16    public Pen(long productId,String model){
17        this(productId,model,null);
18    }
19    public Pen(long productId,String model,String brand){
20        this(productId,model,brand,0);
21    }
22    public Pen(long productId,String model,String brand,double price){
23        this.productId=productId;
24        this.model=model;
25        this.brand=brand;
26        this.price=price;
27        count++;
28        print=print+"\nPen "+productId+" model "+model+" "+brand+" "+price;
29    }
30
31    public static String allPen(){
32        return print;
33    }
34 }
```



```
1 class TestPen{
2     public static void main(String[] args){
3         Pen p1 = new Pen(1,"001","pentel",200);
4         Pen p2 = new Pen(2,"075","Wanpen",100);
5         Pen p3 = new Pen(3,"089","Duanpen",60);
6         System.out.println("Pen : "+Pen.allPen());
7     }
8 }
```

```
javac "TestPen.java"
Process started >>>
<<< Process finished. (Exit code 0)
java "TestPen"
Process started >>>
Pen :
Pen 1 model 001 pentel 200.0
Pen 2 model 075 Wanpen 100.0
Pen 3 model 089 Duanpen 60.0
<<< Process finished. (Exit code 0)
===== READY =====
```

Java source file length : 240 lines : 9 Ln : 9 Col : 1 Sel : 0 | 0 Dos\Wir

3. สร้าง class นาฬิกาจับเวลา โดยมี Attribute 2 ตัว startTime และ endTime พร้อม getter setter โดยมี
- Constructor Stopwatch() ไว้ กำหนด startTime เป็นเวลาปัจจุบัน
 - method Start() จะกำหนด startTime ให้เท่ากับ เวลาในปัจจุบัน

- method stop() จะกำหนด endTime ให้เท่ากับ เวลาในปัจจุบัน
- method getElapsedTime() จะเป็นการจับเวลา endTime - startTime

เขียน Driver Class เพื่อทดสอบ

Stopwatch
-startTime : long
-endTime : long
+Stopwatch()
+start() : void
+stop() : void
+getElapsedTime() : long

The image shows two Notepad++ windows. The top window, titled 'C:\Users\Imagine\Documents\JAVA-INT102\Post11\Stopwatch.java - Notepad++', contains the following Java code for the Stopwatch class:

```

1 class Stopwatch{
2     private long startTime;
3     private long endTime;
4
5     public Stopwatch(){
6         this.startTime=System.currentTimeMillis();
7     }
8
9     public void setStartTime(long startTime){
10        this.startTime=startTime;
11    }
12    public long getStartTime(){
13        return startTime;
14    }
15    public void setEndTime(long endTime){
16        this.endTime=endTime;
17    }
18    public long getEndTime(){
19        return endTime;
20    }
21
22    public void start(){
23        this.startTime=System.currentTimeMillis();
24    }
25    public void stop(){
26        this.endTime=System.currentTimeMillis();
27    }
28    public long getElapsedTime(){
29        return endTime-startTime;
30    }
31 }
32

```

The bottom window, titled 'C:\Users\Imagine\Documents\JAVA-INT102\Post11\TestStopwatch.java - Notepad++', contains the following Java code for the TestStopwatch class:

```

1 class TestStopwatch{
2     public static void main(String[] args){
3         Stopwatch sw = new Stopwatch();
4         sw.start();
5         for(int i=0; i<1000; i++){
6             System.out.println("Count : "+i);
7         }
8         sw.stop();
9         System.out.println("ElapsedTime : "+sw.getElapsedTime()+" milliseconds");
10    }
11 }

```

Below the code windows is a Console window showing the output of the program:

```

Count : 992
Count : 993
Count : 994
Count : 995
Count : 996
Count : 997
Count : 998
Count : 999
ElapsedTime : 778 milliseconds
<<< Process finished. (Exit code 0)
===== READY =====

```