Examples

Week 12

객체를 통한 static 멤버 사용

```
class StaticSample {
   public int n;
   public void g() {
      m = 20;
   }
   public void h() {
      m = 30;
   }
   public static int m;
   public static void f() {
      m = 5;
   }
}
```

```
50
5
```

```
public class Ex {
   public static void main(String[] args)
   {
      StaticSample s1, s2;
      s1 = new StaticSample();
      s1.n = 5;
      s1.g();
      s1.m = 50;  // static
      System.out.println(s1.m);
      s2 = new StaticSample();
      s2.n = 8;
      s2.h();
      s2.f();  // static
      System.out.println(s2.m);
   }
}
```

클래스이름을 통한 static 멤버 사용

```
class StaticSample {
   public int n;
   public void g() {
      m = 20;
   }
   public void h() {
      m = 30;
   }
   public static int m;
   public static void f() {
      m = 5;
   }
}
```

```
10
5
5
```

```
public class Ex {
   public static void main(String[] args)
   {

      StaticSample.m = 10;
      System.out.println(StaticSample.m);

      StaticSample.f();
      System.out.println(StaticSample.m);

      StaticSample s1;
      s1 = new StaticSample();
      System.out.println(s1.m);
   }
}
```

클래스이름을 통한 static 멤버 사용 (Employee 클래스)

```
class Employee
{
    private String name;
    private static int count = 0;

    public Employee(String name)
    {
        this.name = name;
        ++count;
    }

    public String toString()
    {
        return "Employee: " + name;
    }

    public static int getCount()
    {
        return count;
    }
}
```

클래스이름을 통한 static 멤버 사용 (Employee 클래스)

```
public class EmployeeTest
{
    public static void main( String[] args )
    {
        System.out.println( Employee.getCount() );
        Employee e1 = new Employee( "Susan Baker" );
        Employee e2 = new Employee( "Bob Blue" );
        System.out.println( e1 );
        System.out.println( e2 );
        System.out.println( Employee.getCount() );
    }
}
```

```
0
Employee: Susan Baker
Employee: Bob Blue
2
```

Math클래스 (수학 함수와 상수를 static 멤버로 제공)

Method	Description	Example
`abs( x )`	absolute value of *x*	`abs( 23.7 )` is 23.7 `abs( 0.0 )` is 0.0 `abs( -23.7 )` is 23.7
`ceil( x )`	rounds *x* to the smallest integer not less than *x*	`ceil( 9.2 )` is 10.0 `ceil( -9.8 )` is -9.0
`cos( x )`	trigonometric cosine of *x* (*x* in radians)	`cos( 0.0 )` is 1.0
`exp( x )`	exponential method e^x	`exp( 1.0 )` is 2.71828 `exp( 2.0 )` is 7.38906
`floor( x )`	rounds *x* to the largest integer not greater than *x*	`floor( 9.2 )` is 9.0 `floor( -9.8 )` is -10.0
`log( x )`	natural logarithm of *x* (base *e*)	`log( Math.E )` is 1.0 `log( Math.E * Math.E )` is 2.0
`max( x, y )`	larger value of *x* and *y*	`max( 2.3, 12.7 )` is 12.7 `max( -2.3, -12.7 )` is -2.3
`min( x, y )`	smaller value of *x* and *y*	`min( 2.3, 12.7 )` is 2.3 `min( -2.3, -12.7 )` is -12.7
`pow( x, y )`	*x* raised to the power *y* (i.e., x^y)	`pow( 2.0, 7.0 )` is 128.0 `pow( 9.0, 0.5 )` is 3.0
`sin( x )`	trigonometric sine of *x* (*x* in radians)	`sin( 0.0 )` is 0.0
`sqrt( x )`	square root of *x*	`sqrt( 900.0 )` is 30.0
`tan( x )`	trigonometric tangent of *x* (*x* in radians)	`tan( 0.0 )` is 0.0

Math클래스 (수학 함수와 상수를 static 멤버로 제공)

```
public class MathTest
{
    public static void main( String[] args )
    {
        System.out.printf( "sqrt(900.0)=%.2f\n", Math.sqrt(900.0) );
        System.out.printf( "cos(900.0)=%.2f\n", Math.cos(900.0) );
        System.out.printf( "log(900.0)=%.2f\n", Math.log(900.0) );
        System.out.printf( "floor(9.25)=%.2f\n", Math.floor(9.25) );
        System.out.println( "PI=" + Math.PI );
    }
}
```

```
sqrt(900.0)=30.00
cos(900.0)=0.07
log(900.0)=6.80
floor(9.25)=9.00
PI= 3.141592653589793
```

Calc클래스 (static 멤버 제공)

```
class Calc {
    public static int abs(int a) { return a>0 ? a : -a; }
    public static int max(int a, int b) { return (a>b) ? a : b; }
    public static int min(int a, int b) { return (a>b) ? b : a; }
}

public class CalcEx {
   public static void main( String[] args ) {
      System.out.println( Calc.abs(-5) );
      System.out.println( Calc.max(10, 8) );
      System.out.println( Calc.min(-3, -8) );
   }
}
```

```
5
10
-8
```

static 메소드 (non-static 멤버를 접근할 수 없음)

```
public class StaticMethod
{
    int n;
    void f1(int x) { n = x; }
    void f2(int x) { m = x; }

    static int m;
    static void s1(int x) { n = x; }
    static void s2(int x) { f1(3); }
    static void s3(int x) { m = x; }
    static void s4(int x) { s3(3); }
}
```

```
StaticMethod.java:8: error: non-static variable n cannot be referenced from
a static context
        static void s1(int x) { n = x; }
                                ^
StaticMethod.java:9: error: non-static method f1(int) cannot be referenced
from a static context
        static void s2(int x) { f1(3); }
                                ^
```

static 메소드 (this 사용불가)

```
public class StaticAndThis
{
    int n;
    static int m;

    void f1(int x) { this.n = x; }
    void f2(int x) { this.m = x; }
    static void s1(int x) { this.n = x; }
    static void s2(int x) { this.m = x; }
}
```

```
StaticAndThis.java:8: error: non-static variable this cannot be referenced
from a static context
        static void s1(int x) { this.n = x; }
                                ^
StaticAndThis.java:9: error: non-static variable this cannot be referenced
from a static context
        static void s2(int x) { this.n = x; }
                                ^
```

CurrencyConverter 클래스 (static 멤버 제공)

```
import java.util.Scanner;

class CurrencyConverter
{
    private static double rate;

    public static double toDollar(double won) {
        return won/rate;
    }

    public static double toKRW(double dollar) {
        return dollar * rate;
    }

    public static void setRate(double r) {
        rate = r;
    }
}
```

CurrencyConverter 클래스 (static 멤버 제공)

```
public class CurrencyConverterTest
{
    public static void main(String[] args)
    {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Exchange rate ($1) >> ");
        double rate = scanner.nextDouble();
        CurrencyConverter.setRate(rate);

        System.out.printf("%,d KRW = $%,.2f\n",
            100000, CurrencyConverter.toDollar(100000) );
        System.out.printf("$%,d = %,d KRW\n",
            100, (int) CurrencyConverter.toKRW(100) );
        scanner.close();
    }
}
```

```
Exchange rate ($1) >> 1164
100,000 KRW = $85.91
$100 = 116,400 KRW
```

2차 방정식의 실수해

- 내용: 2차 방정식 $ax^2 + bx + c = 0$ 의 실수해 구하기
- 입력: a, b, c (double type)
- $b^2 - 4ac$ 의 값에 따라 아래와 같이 처리
  - $b^2 - 4ac < 0$ 인 경우: "no answer" 라고 출력
  - $b^2 - 4ac = 0$ 인 경우: 한 개의 x 값 출력
  - $b^2 - 4ac > 0$ 인 경우: 두 개의 x 값 출력
- `Math.sqrt()` 사용
- 근의 공식:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$