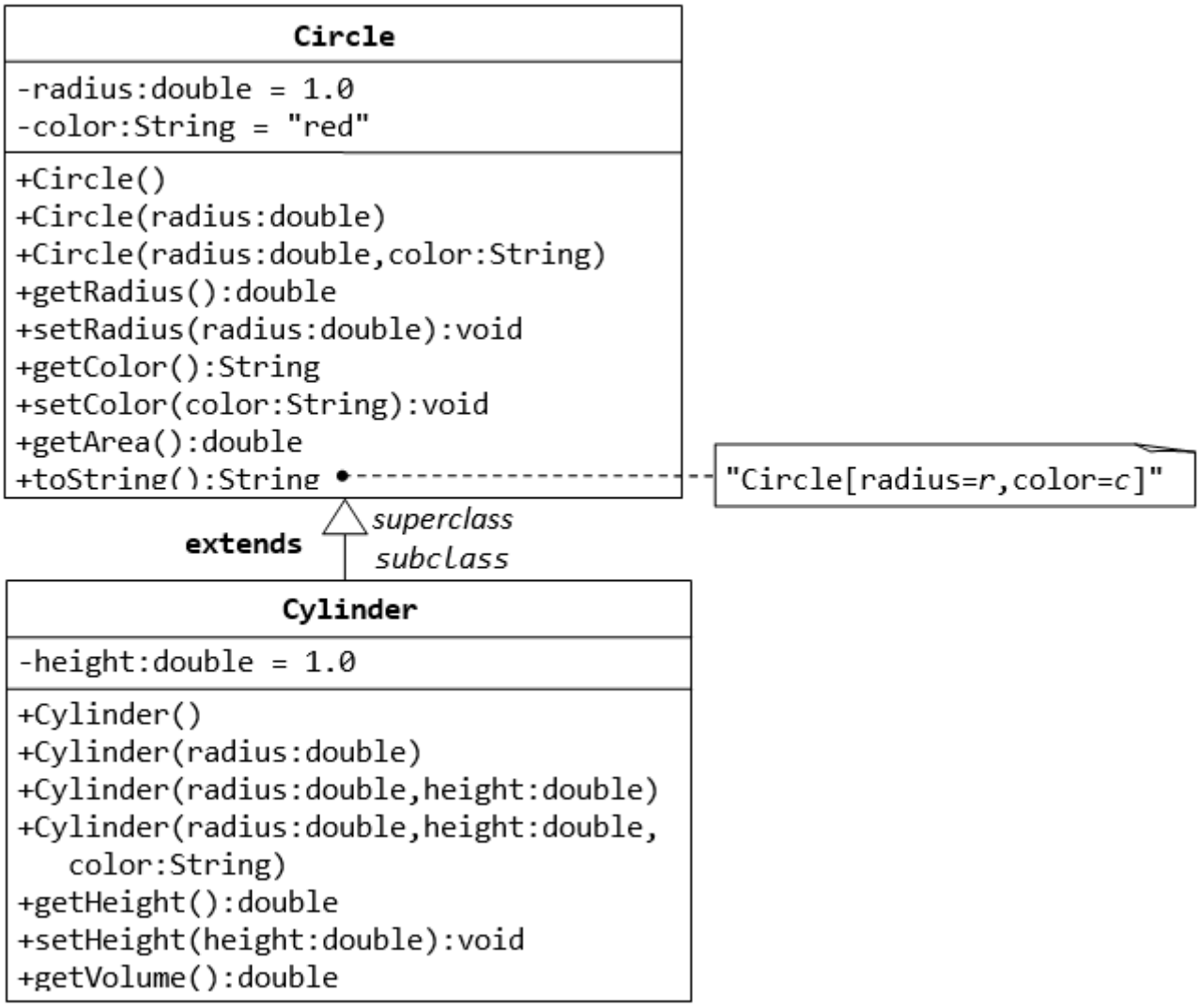
Week 2 assignment

Inheritance, polymorphism and Exception handling

Inheritance and polymorphism

Create classes `Circle` and `Cylinder` as shown in the *UML* diagram below:



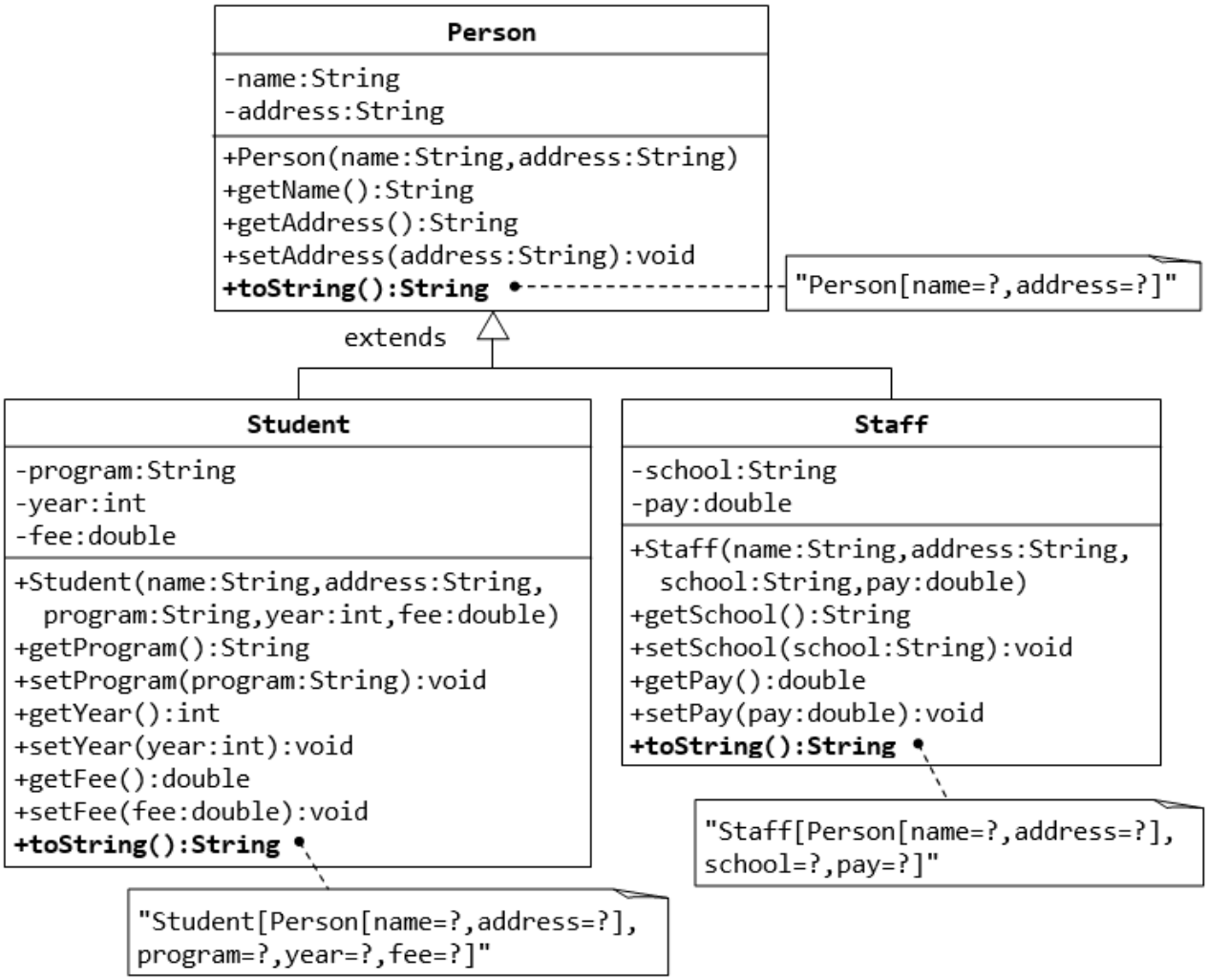
In the `main()` function of a Program class, create an array of `Circle` references with the initialization shown below:

```
Circle[] circles = {
    new Cylinder(12.34),
    new Cylinder(12.34, 10.0),
    new Cylinder(12.34, 10.0, "blue")
};
```

Print the area of the circular region of each cylinder along with the volume of the same.

Classes, inheritance and polymorphism

Create the classes `Person`, `Student`, and `Staff` as shown in the *UML* diagram below:



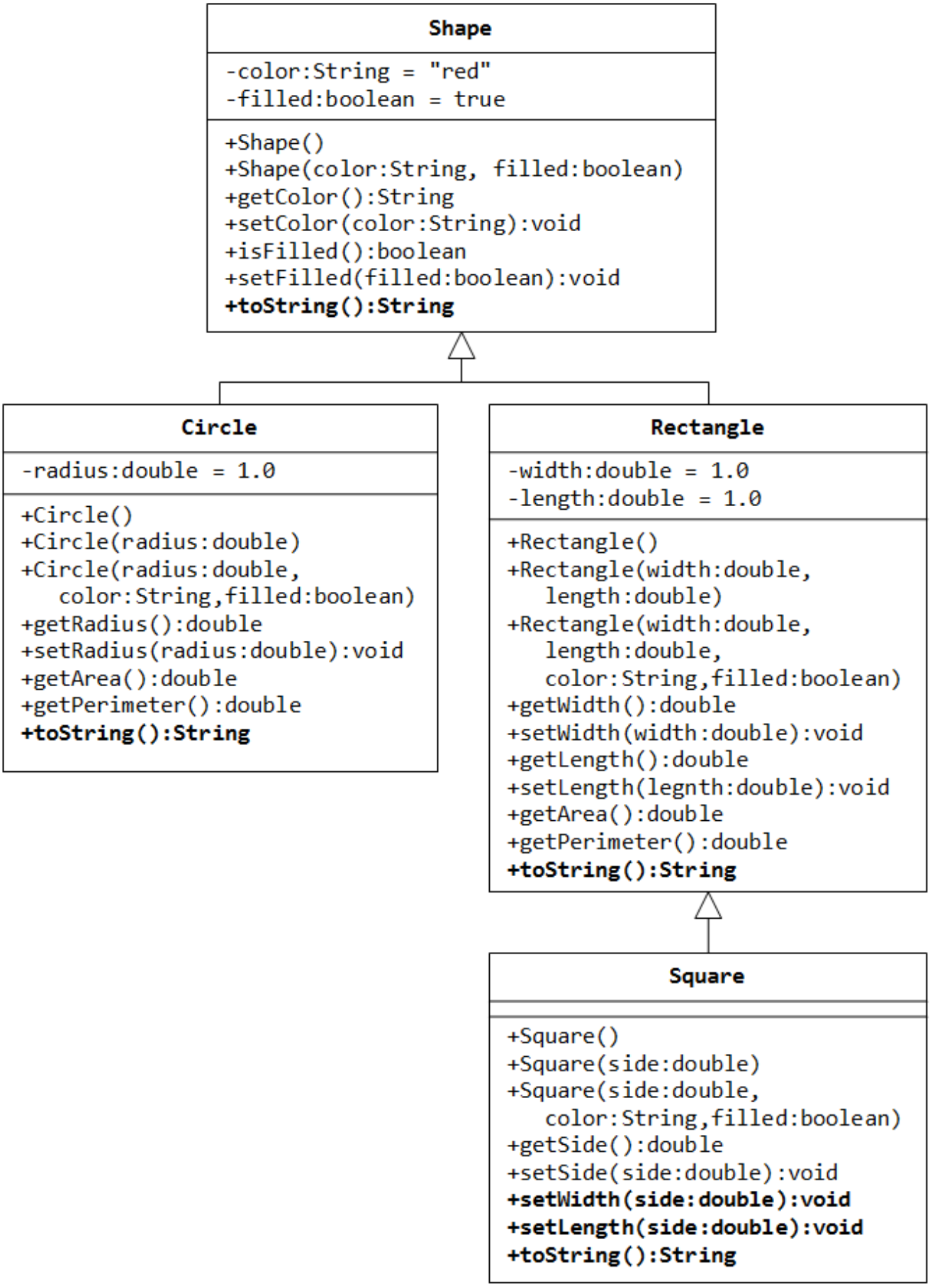
In the `main()` function of a Program class, create an array of `Person` references with the initialisation shown below:

```
Person[] people = {
    new Student("Shyam", "Bangalore, Karnataka", "Java fundamentals",
2010, 4500.0),
    new Staff("Anand", "Bangalore, Karnataka", "Delhi Public school",
35000.0),
    new Staff("Umesh", "Bangalore, Karnataka", "National Public school",
42000.0),
    new Student("Suresh", "Hassan, Karnataka", "Java fundamentals", 2012,
4750.0),
    new Student("Kiran", "Vasco, Goa", "ReactJS", 2017, 12500.0)
};
```

Print the details of all `Person` objects (using the `toString()`).

Classes, inheritance and polymorphism

Create the classes `Shape`, `Circle`, `Rectangle`, and `Square` as shown in the *UML* diagram below:



The `toString` function of the above classes should return text as given below:

Classname	Sample return value from toString()

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Shape	A Shape with color of xxx and filled/Not filled
Circle	A Circle with radius=xxx, which is a subclass of yyy (where yyy is the output of the toString() method from the superclass)
Rectangle	A Rectangle with width=xxx and length=zzz, which is a subclass of yyy (where yyy is the output of the toString() method from the superclass)
Square	A Square with side=xxx, which is a subclass of yyy (where yyy is the output of the toString() method from the superclass)

In the `main()` method of a Program class, create an array of 10 `Shape` references containing a mixture of `Circle`, `Rectangle` and `Square` objects of different dimensions. Using a loop, print the `perimeter` and `area` for all of them.

Summarize user inputs

Write a Java application to accept integers in a loop. After each number is accepted, the user should be asked if he/she wishes to continue. If the user inputs "NO", then the loop should be stopped and following output should be displayed:

```
Number of inputs = X
Number of integer inputs = Y
Number of non-integer inputs = Z
Sum of all integer inputs = XX
The integer inputs = N1, N2, N3, ...
The non-integer inputs = ASD, SDF, DFG, ...
X, Y, Z, etc should be actual values, based on the inputs.
```

HINT:

Use `java.util.Scanner` for accepting data from the user.

```
Scanner s = new Scanner(System.in);
String input = s.nextLine();
int n = s.nextInt();
double d = s.nextDouble();
// ... s
```

Calendar array

Write a function called "calendar" that takes a String representing year/month in YYYY-MM format and returns a two-dimensional array representing the calendar for the input month and year.

For example, if the input is "2018-03", then the output is:

```
{
    {0, 0, 0, 0, 1, 2, 3},
    {4, 5, 6, 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}
}
```

For input "2018-02", the output should be:

```
{
    {0, 0, 0, 0, 1, 2, 3},
    {4, 5, 6, 7, 8, 9 10},
    {11, 12, 13, 14, 15, 16, 17},
    {18, 19, 20, 21, 22, 23, 24},
    {25, 26, 27, 28, 0, 0, 0}
}
```

The method should throw a custom exception **InvalidDateException**, in case if the input does not represent a valid year/month combination, and **InvalidInputException** in case if the input is not in the expected YYYY-MM format.