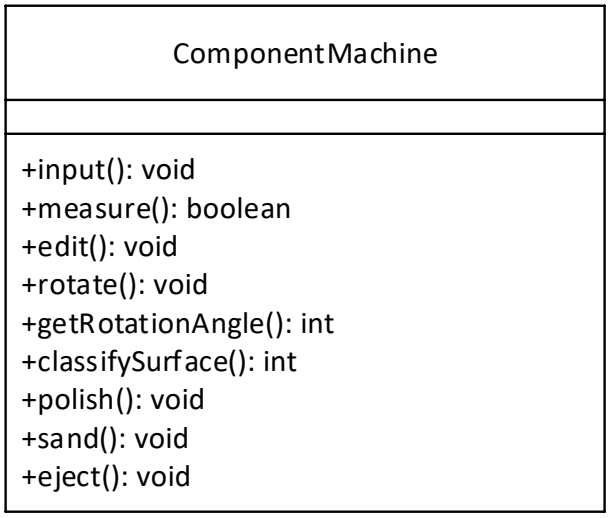
ASE Exercise 7

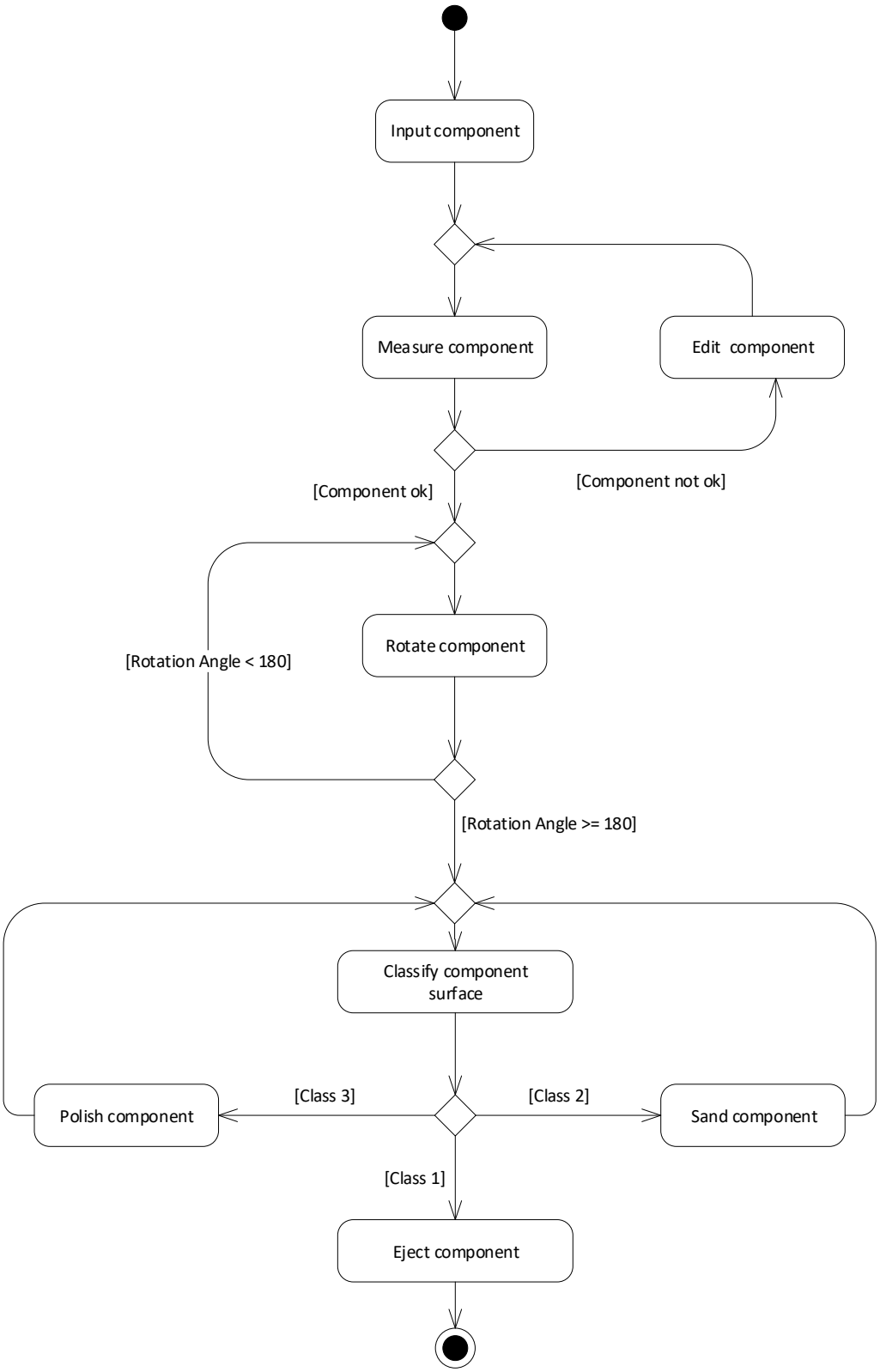
Task 1 (Activity & Class diagram)

Implement a class `Control` that within its `main` method creates an instance of `ComponentMachine` and uses it according to the given activity and class diagram and the following information:

- The method `measure` returns `true` if the measurements of the component (currently placed inside the machine) are within tolerances and `false` otherwise.
- The method `getRotationAngle()` returns the angle of rotation of the component
- The method `classifySurface()` returns the quality class of the component.

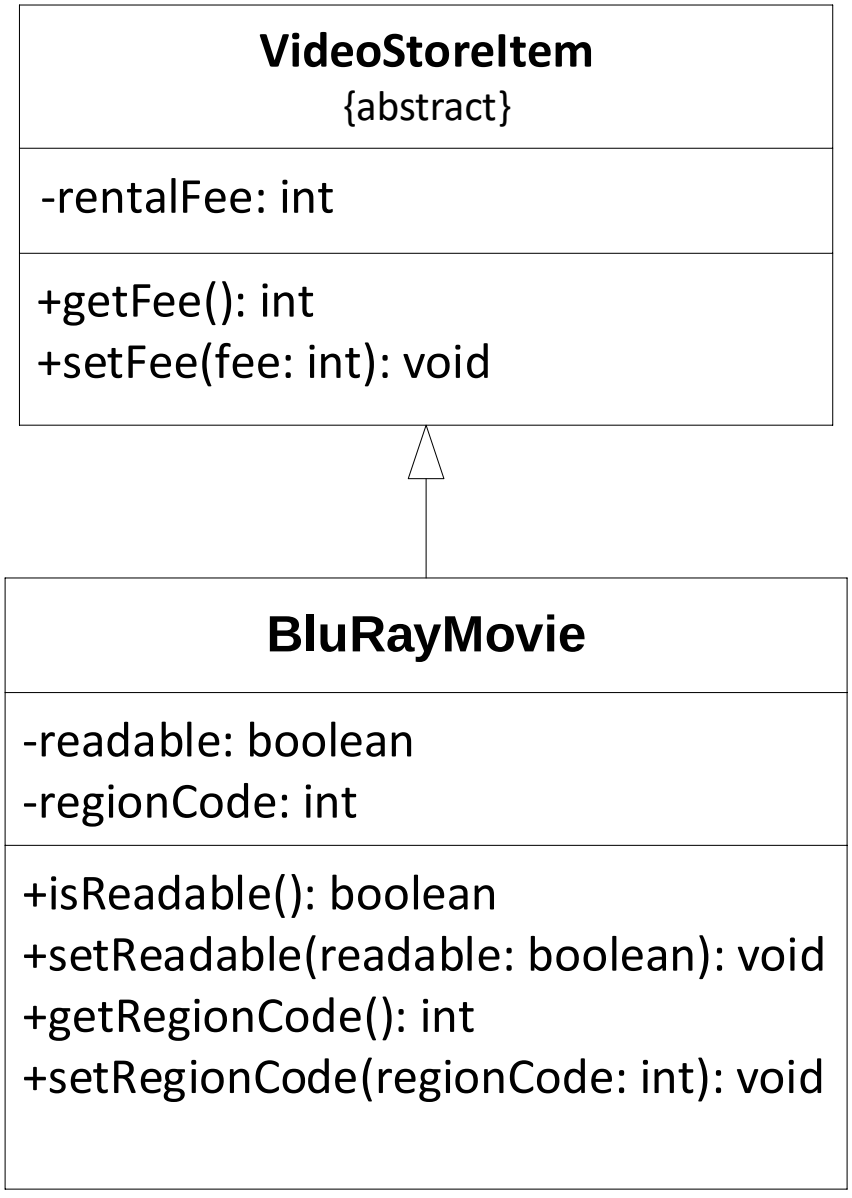
For this to work in Eclipse you first have to create the class `ComponentMachine` according to the class diagram, but you can just create methods with empty bodies, i.e. the methods do not need to be functional (but all the methods have to be there, because we use them in the class `Control`). **The alternative and preferred approach is to solve the task by using pen & paper – because you only have pen & paper during the exam!**




Input component
Measure component
Edit component
[Component ok]
[Component not ok]
Rotate component
[Rotation Angle < 180]
[Rotation Angle >= 180]
Classify component surface
Polish component
[Class 3]
[Class 2]
Sand component
[Class 1]
Eject component

Task 2 (Class diagram)

Given the following class diagram, write the code for the classes `VideoStoreItem` and `BluRayMovie`.



Task 3 (Basics)

In the following task, you have to answer the given questions. You can note your answers on a piece of paper or in a text document. **You are not allowed to use Eclipse during this task!**

a) Give one example each for the correct definition of the following data types.
   - String
   - Array of doubles

b) Give an example for an explicit type cast!

c) Define a constant with the name E and assign in the value 2.71828.

d) What is the return value of the following function given parameters a=9 und b=2?

```
int function(int a, int b) {
	if (a < b)
		return a * b;
	else
		return a / b;
}
```

e) What is the return value of the following function given parameters a=9.0 und b=3?

```
double function_2(double a, int b) {
	while (b > 1) {
		a = (int) (a / b);
		b--;
	}
	return a;
}
```

f) What is the return value of the following function given parameters a=3 und b=2?

```
int function_3(int a, int b) {
	switch (a + b) {
	case 10:
		a = b;
	case 5:
		a = a * b;
	case 3:
		a = a / b;
		break;
	default:
		a = 0;
	}
	return a;
}
```

g) The following method (which checks if a given number is prime) contains one syntax error. Describe the error and name the line where you found it?

```
1	boolean is_primenumber(int n) {
2		if (n < 2)
3			return false;
4		for (int i = n / 2; i > 1; i--) {
5			if (n % i == 0)
6				return false;
7		}
8		return "Yes!";
9	}
```

h) What does the following method compute?

```
int function(int[] x) {
	int y = x[0];
	for (int i = 1; i<x.length; i++) {
		if (x[i]<y){
			y=x[i];
		}
	}
	return y;
}
```

i) In what way do you have to augment the following method at the blank position so that the method computes if the given number is even?

```
boolean is_even(int x) {
      return ____ == 0;
}
```

j) What do you have to write in line 4, so that the following method computes the factorial of a given number?

```
1     int factorial(int x) throws IllegalArgumentException {
2           if (x < 0 ) throw new IllegalArgumentException();
3           if (x == 1 || x == 0) {
4
5           }
6           return x * factorial(x - 1);
7     }
```

Task 4 (Programming)

Create the method `seriesArray(int n)` based on the following description:

Given n>=0, the method returns an array with the following pattern {1, 1, 2, 1, 2, 3, ... 1, 2, 3 .. n} (spaces were added to show the grouping).

Hint: The length of the array will be 1 + 2 + 3 ... + n, which is known to sum to exactly n*(n + 1)/2.

Examples to test your code:

```
seriesArray(3): [1, 1, 2, 1, 2, 3]
seriesArray(4): [1, 1, 2, 1, 2, 3, 1, 2, 3, 4]
seriesArray(2): [1, 1, 2]
```