

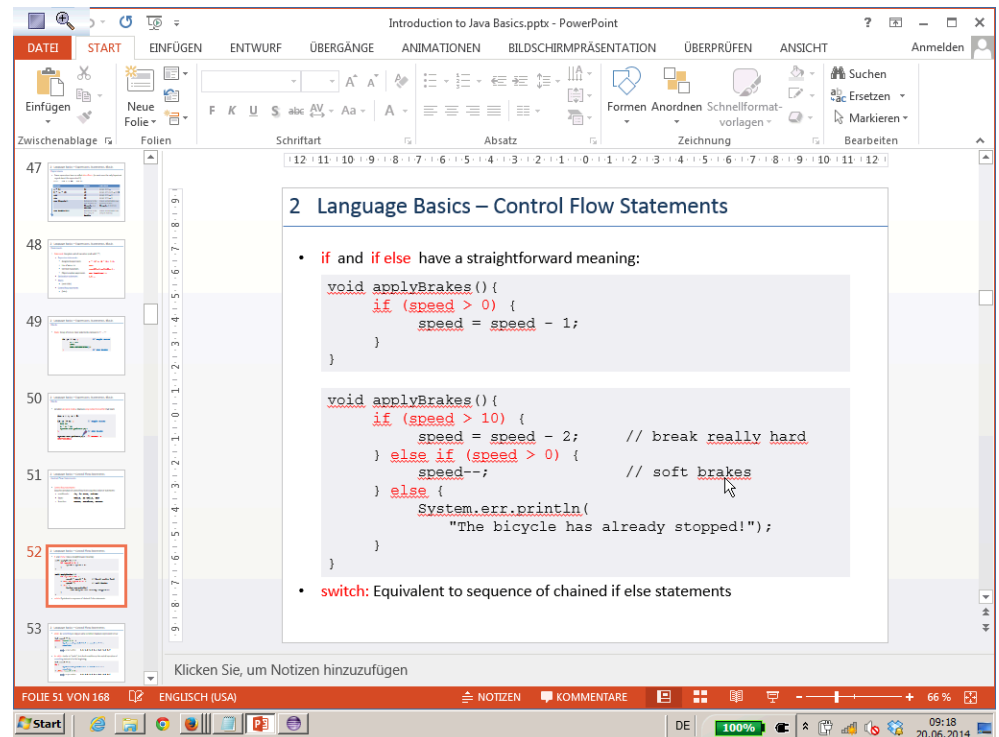
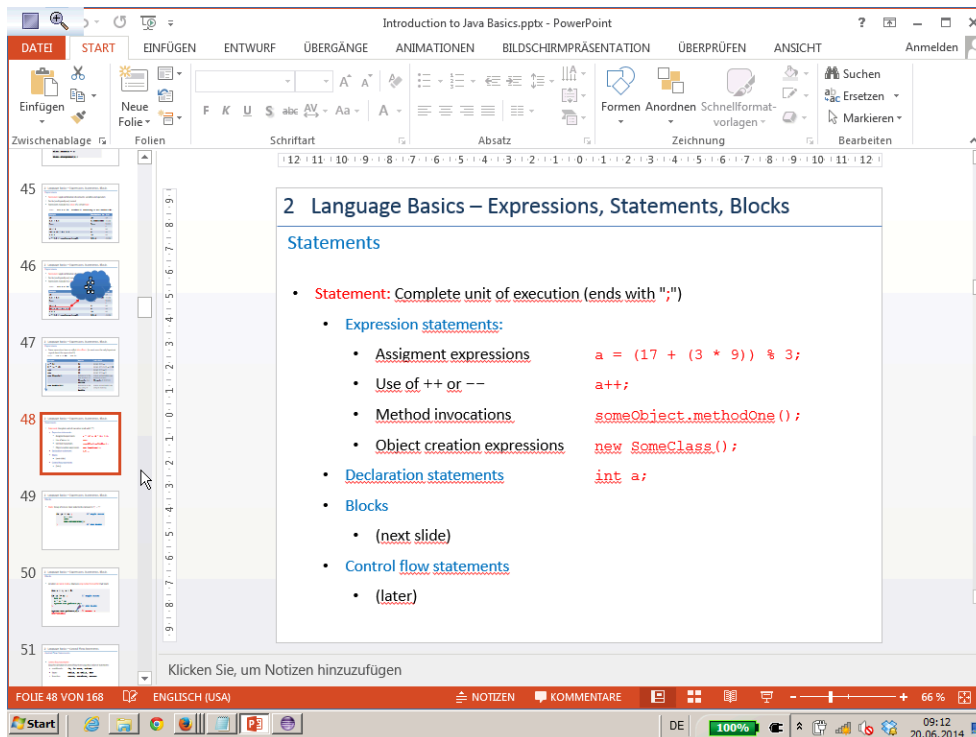
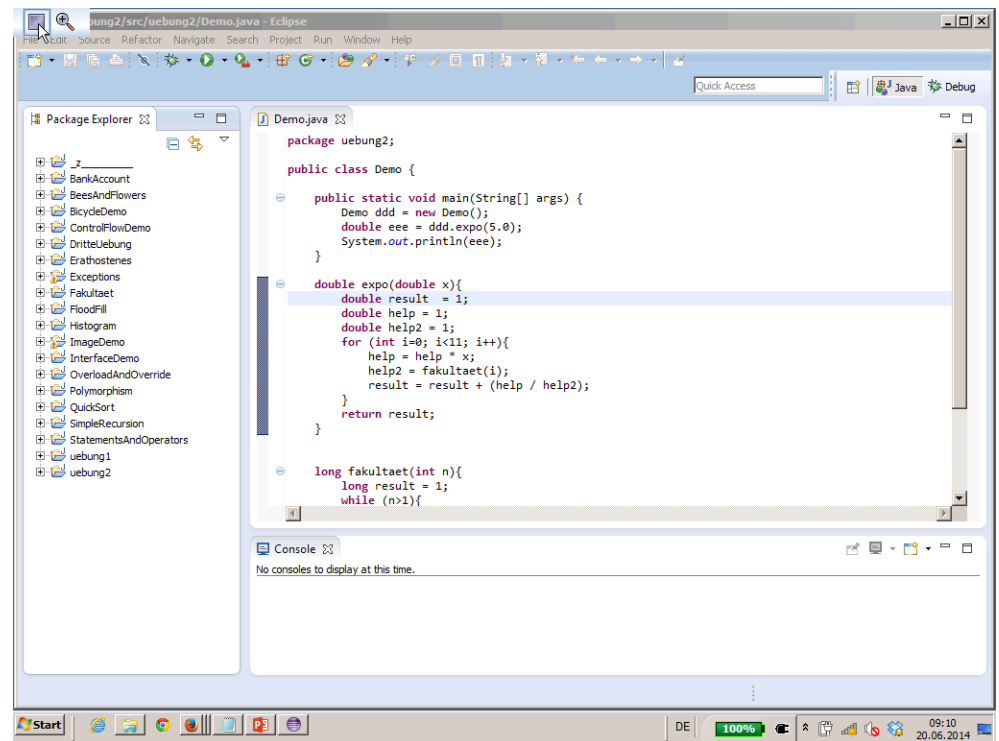
Script generated by TTT

Title: groh: profile1 (20.06.2014)

Date: Fri Jun 20 09:10:57 CEST 2014

Duration: 99:12 min

Pages: 96



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Einfügen Neue Folie

Zwischenablage Folien

2 Language Basics – Control Flow Statements

- if and if else have a straightforward meaning:

```
void applyBrakes() {
    if (speed > 0) {
        speed = speed - 1;
    }
}

void applyBrakes() {
    if (speed > 10) {
        speed = speed - 2; // break really hard
    } else if (speed > 0) {
        speed--; // soft brakes
    } else {
        System.err.println(
            "The bicycle has already stopped!");
    }
}
```

- switch: Equivalent to sequence of chained if else statements

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Einfügen Neue Folie

Zwischenablage Folien

2 Language Basics – Control Flow Statements

- if and if else have a straightforward meaning:

```
void applyBrakes() {
    if (speed > 0) {
        speed = speed - 1;
    }
}

void applyBrakes() {
    if (speed > 10) {
        speed = speed - 2; // break really hard
    } else if (speed > 0) {
        speed--; // soft brakes
    } else {
        System.err.println(
            "The bicycle has already stopped!");
    }
}
```

- switch: Equivalent to sequence of chained if else statements

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Einfügen Neue Folie

Zwischenablage Folien

2 Language Basics – Control Flow Statements

- for: usually means to do something for a fixed number of times:

```
for (int i=0; i<7; i++) { // loop will be executed 7 times
    System.out.print("#:" + i + " ");
}
```

output will be: #:0 #:1 #:2 #:3 #:4 #:5 #:6

- General form:

```
for (initialization; termination; update) {
    statement*
}
```

- initialization expression: Executed once at the beginning of first loop
- termination expression: If true then execute statement(s), else exit loop
- update expression: Executed after each iteration of the loop

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ung2/src/uebung2/Demo.java - Eclipse

File Edit Source Refactor Navigate Search Project Run Window Help

Quick Access Java Debug

Package Explorer

```
package uebung2;

public class Demo {

    public static void main(String[] args) {
        Demo ddd = new Demo();
        double eee = ddd.expo(5.0);
        System.out.println(eee);
    }

    double expo(double x){
        double result = 1;
        double help = 1;
        double help2 = 1;
        for (int i=0; i<11; i++){
            help = help * x;
            help2 = fakultaet(i);
            result = result + (help / help2);
        }
        return result;
    }

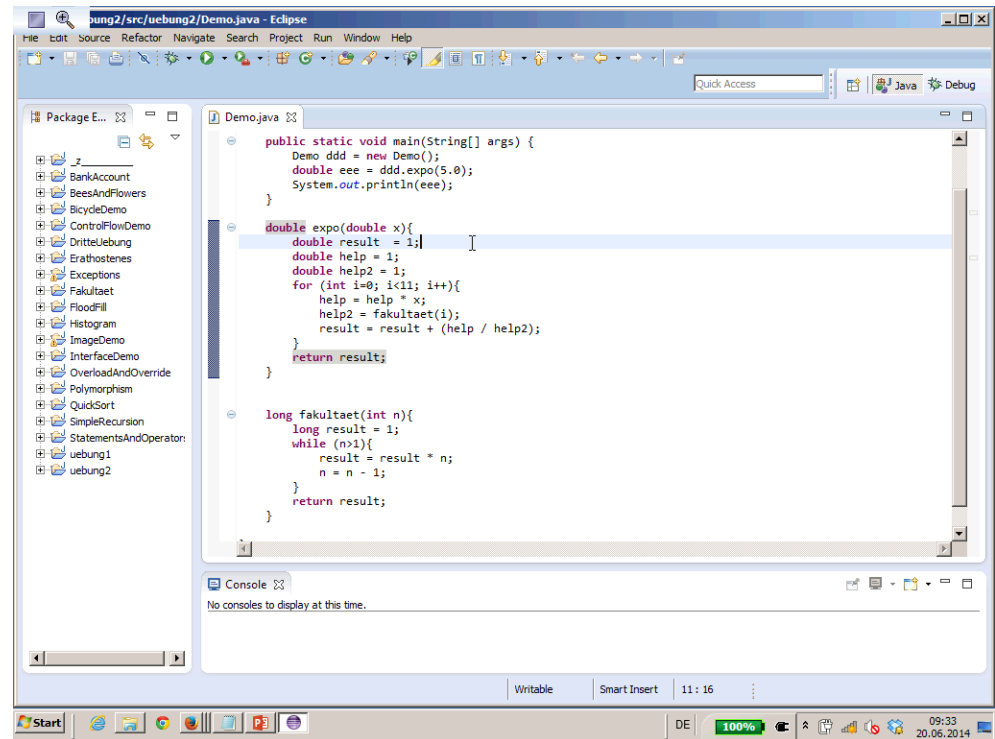
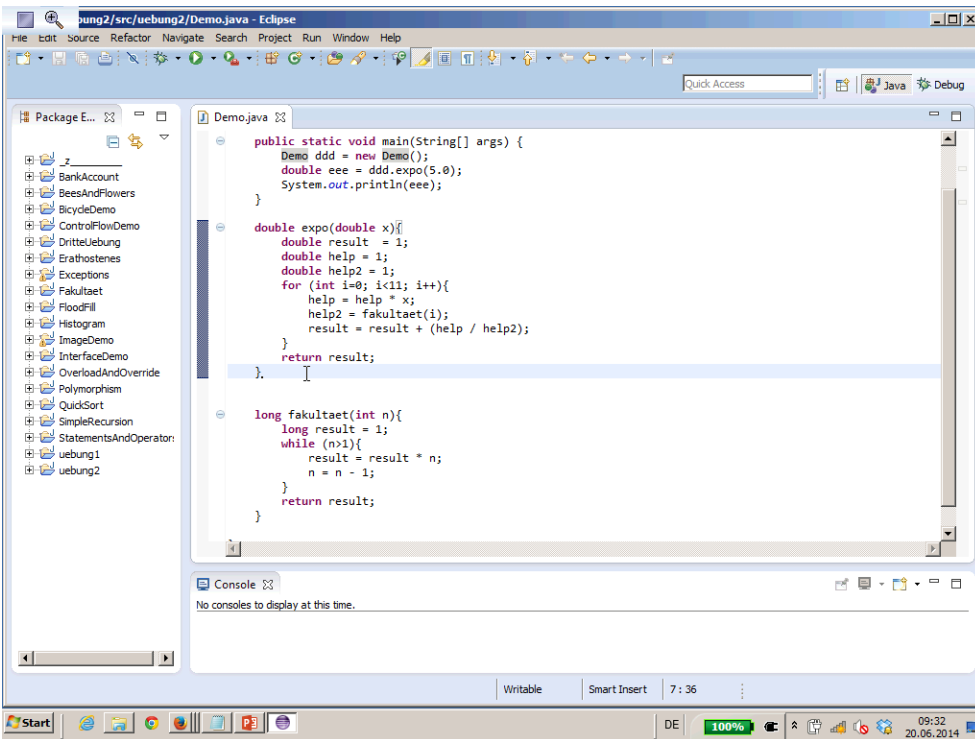
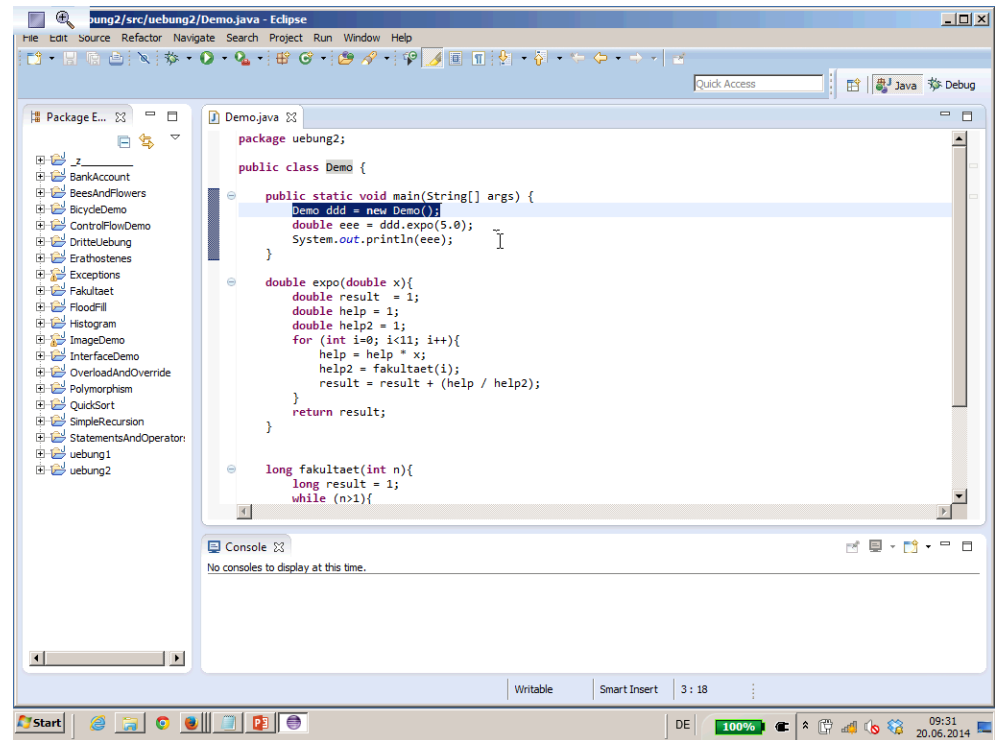
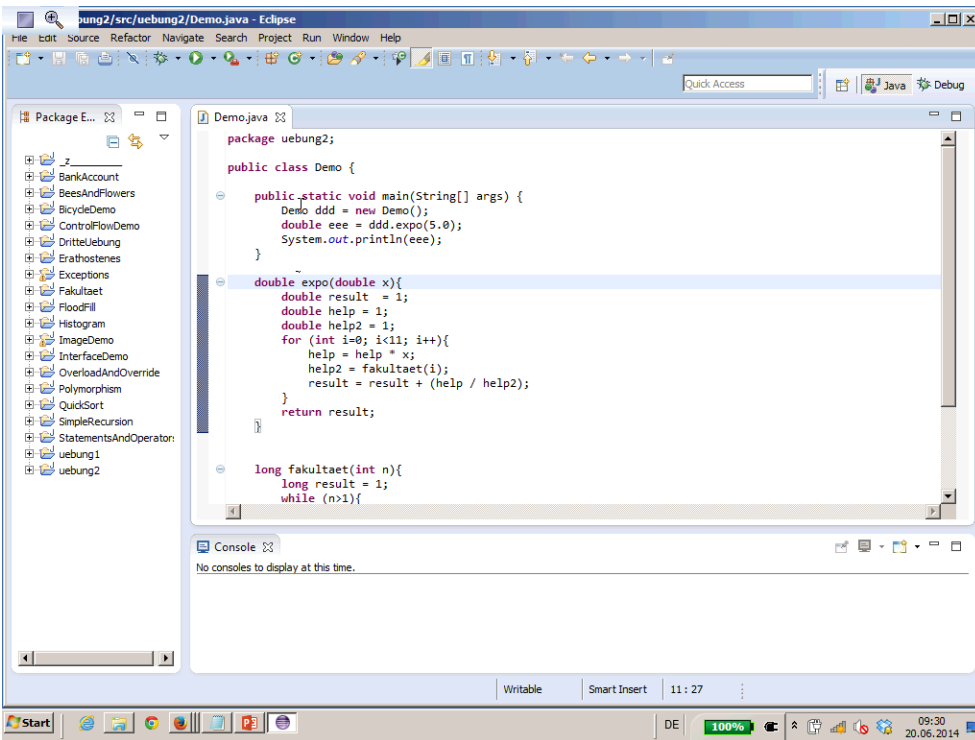
    long fakultaet(int n){
        long result = 1;
        while (n>1){

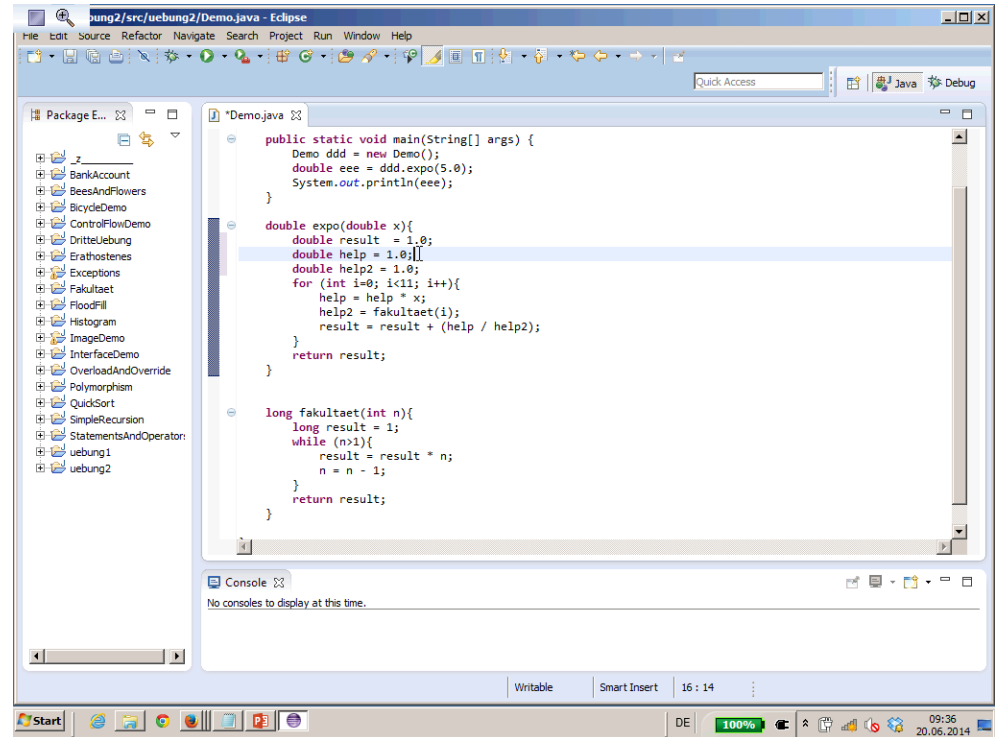
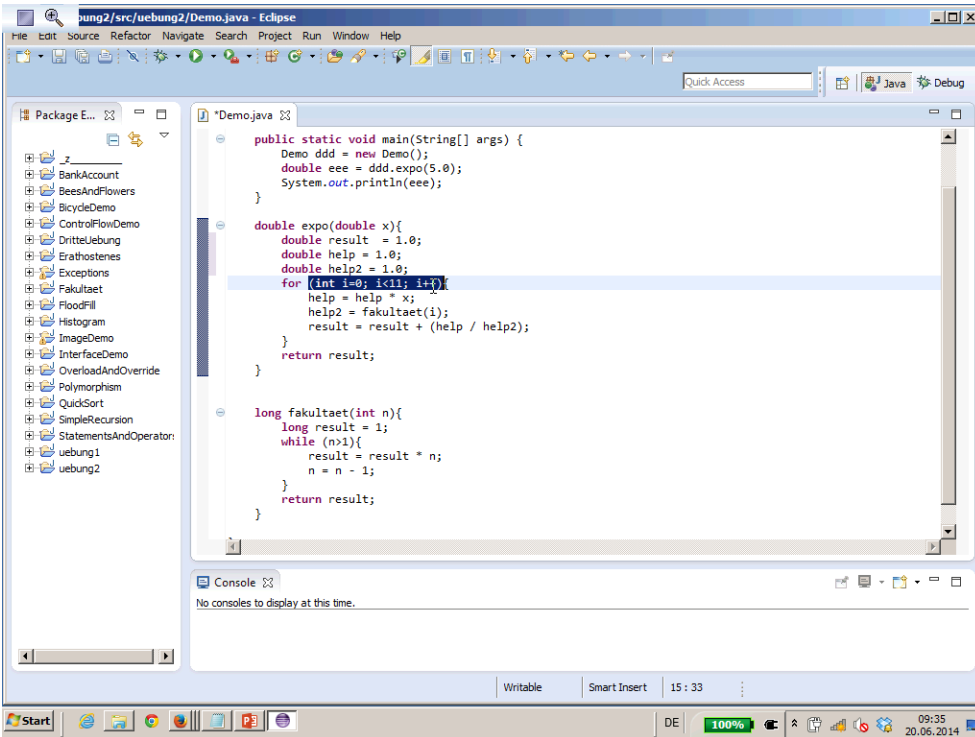
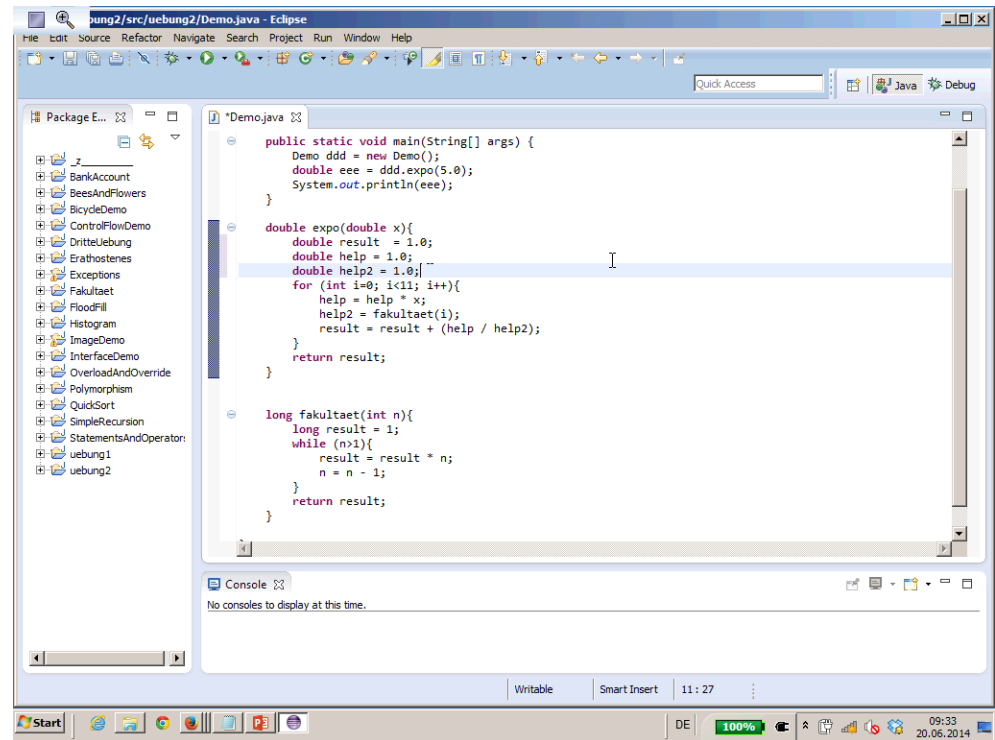
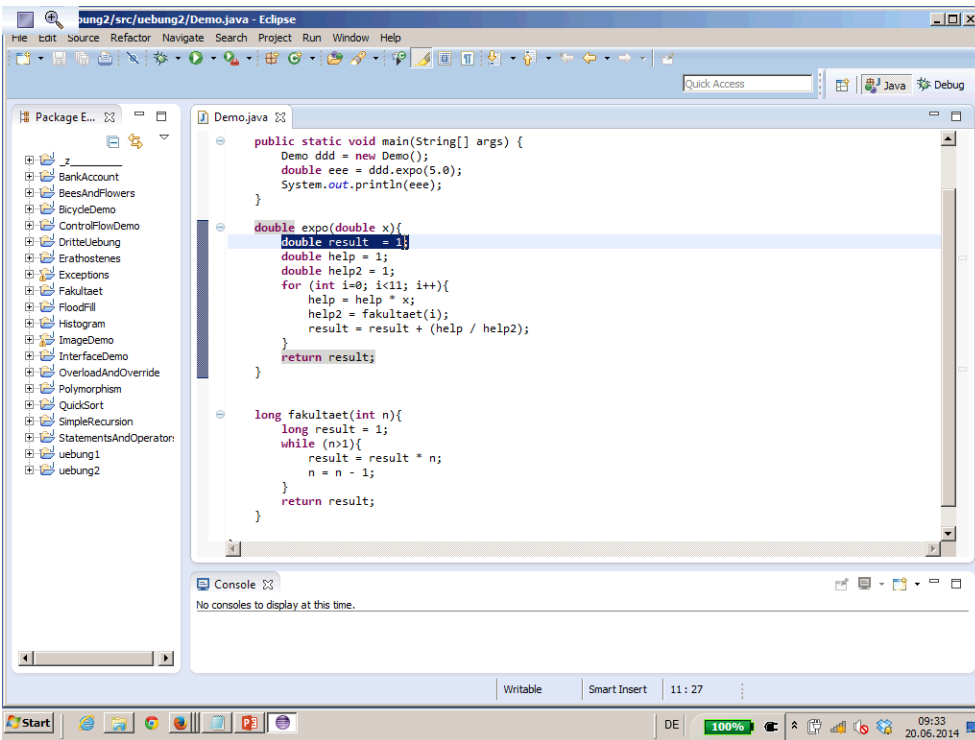
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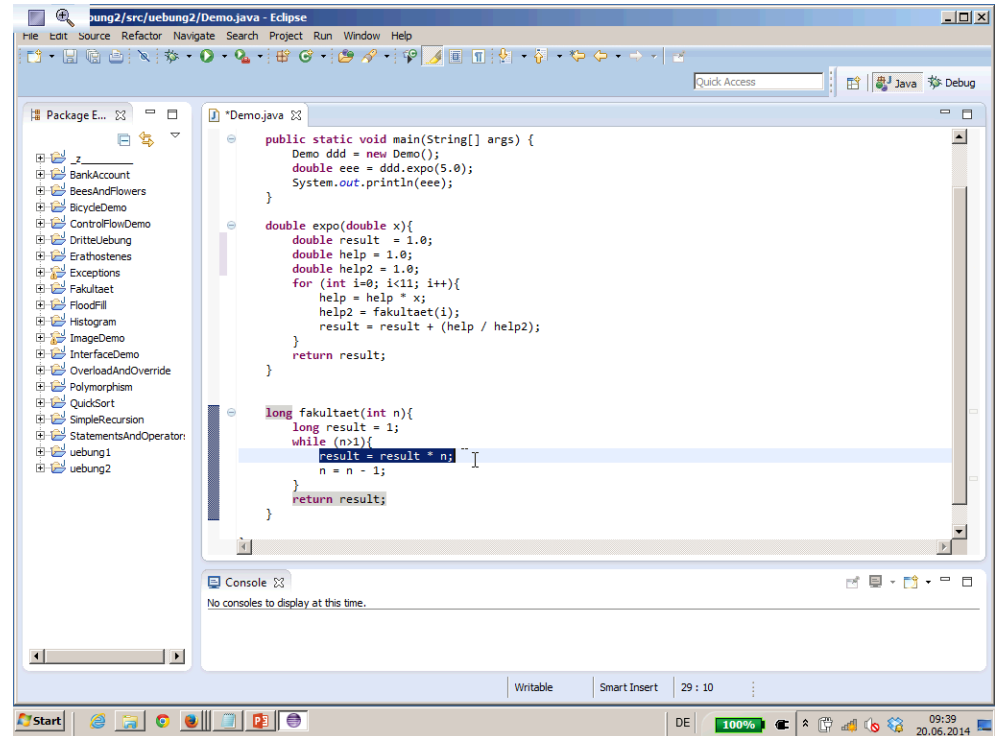
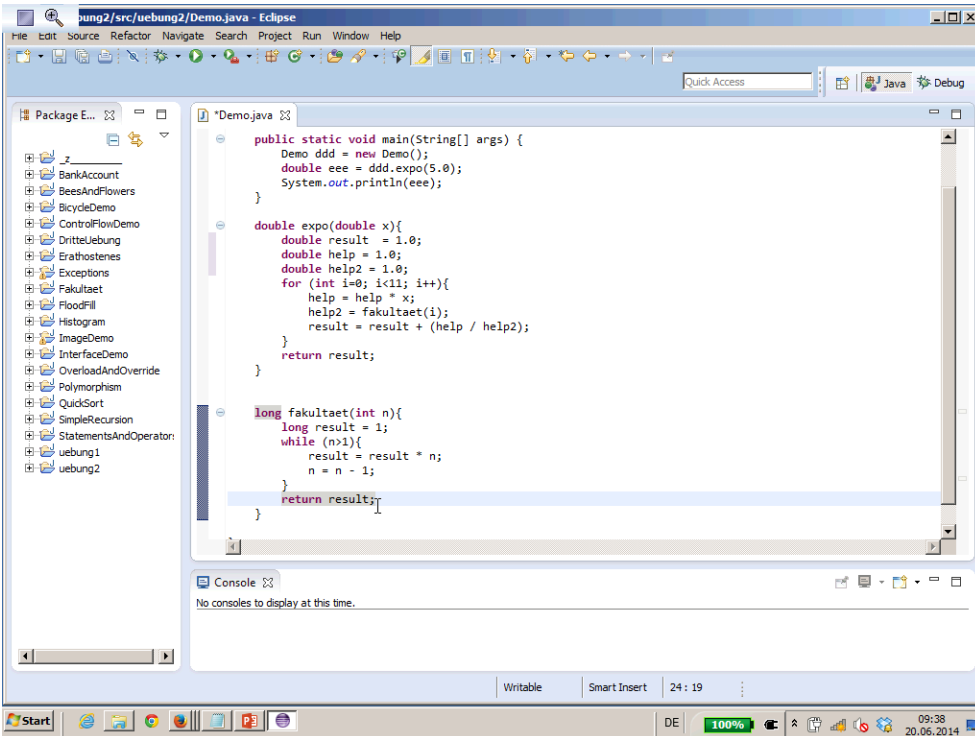
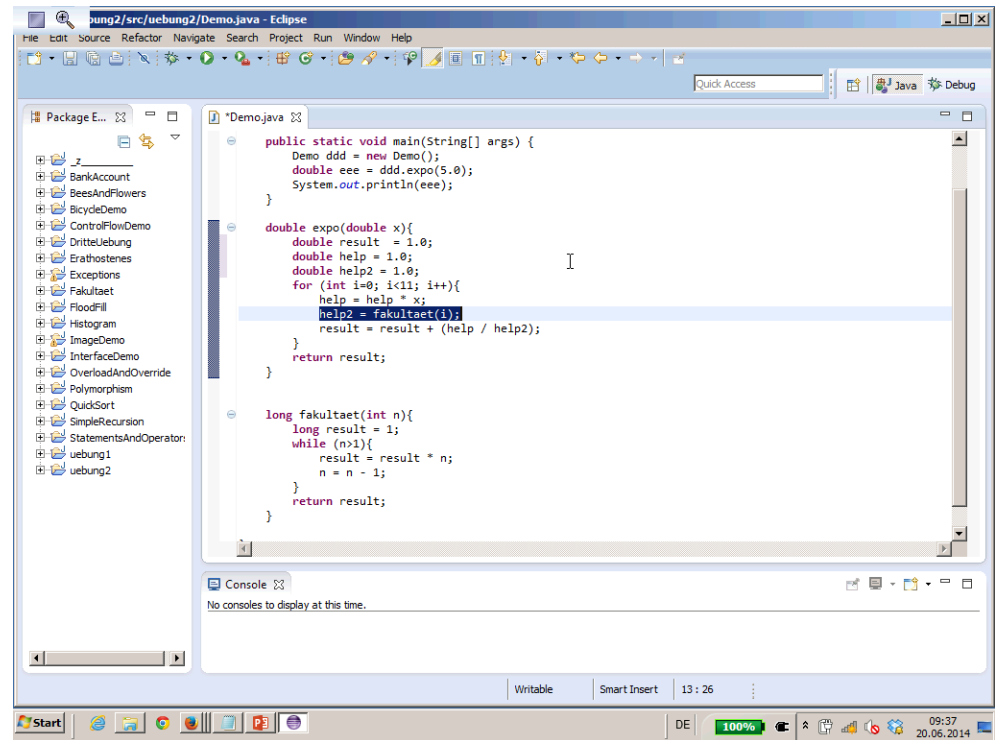
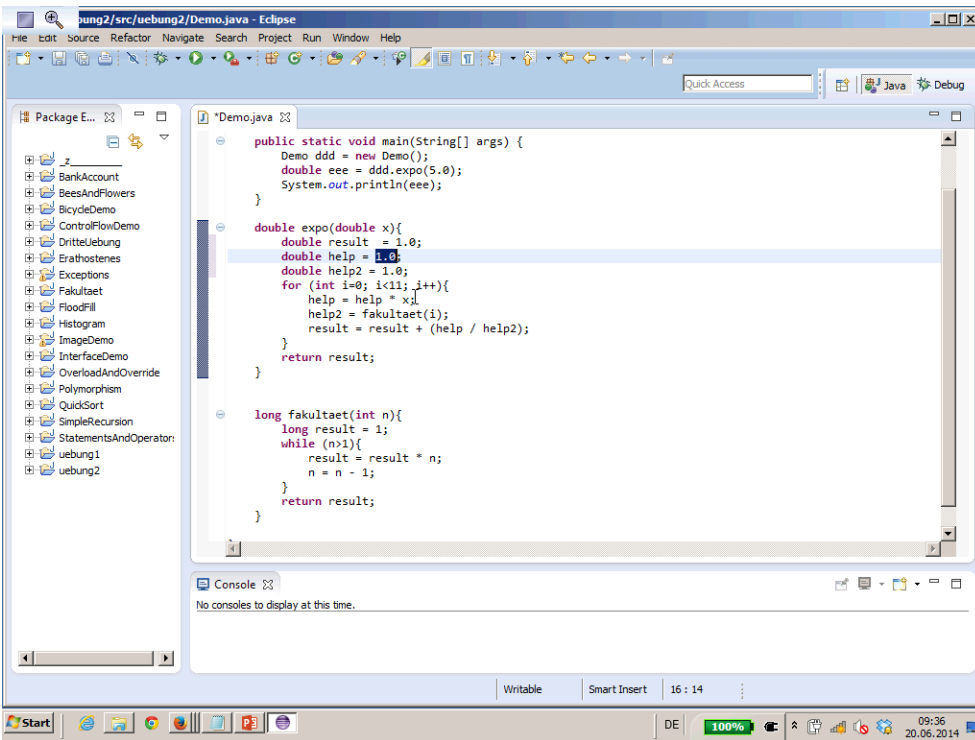
Console

No consoles to display at this time.

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```
public static void main(String[] args) {
    Demo ddd = new Demo();
    double eee = ddd.expo(5.0);
    System.out.println(eee);
}

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=0; i<11; i++){
        help = help * x;
        help2 = fakultaet(i);
        result = result + (help / help2);
    }
    return result;
}

long fakultaet(int n){
    long result = 1;
    while (n>1){
        result = result * n;
        n = n - 1;
    }
    return result;
}
```

```
public static void main(String[] args) {
    Demo ddd = new Demo();
    double eee = ddd.expo(5.0);
    System.out.println(eee);
}

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    for (int i=0; i<11; i++){
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    }
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}

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        n = n - 1;
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    double eee = ddd.expo(5.0);
    System.out.println(eee);
}

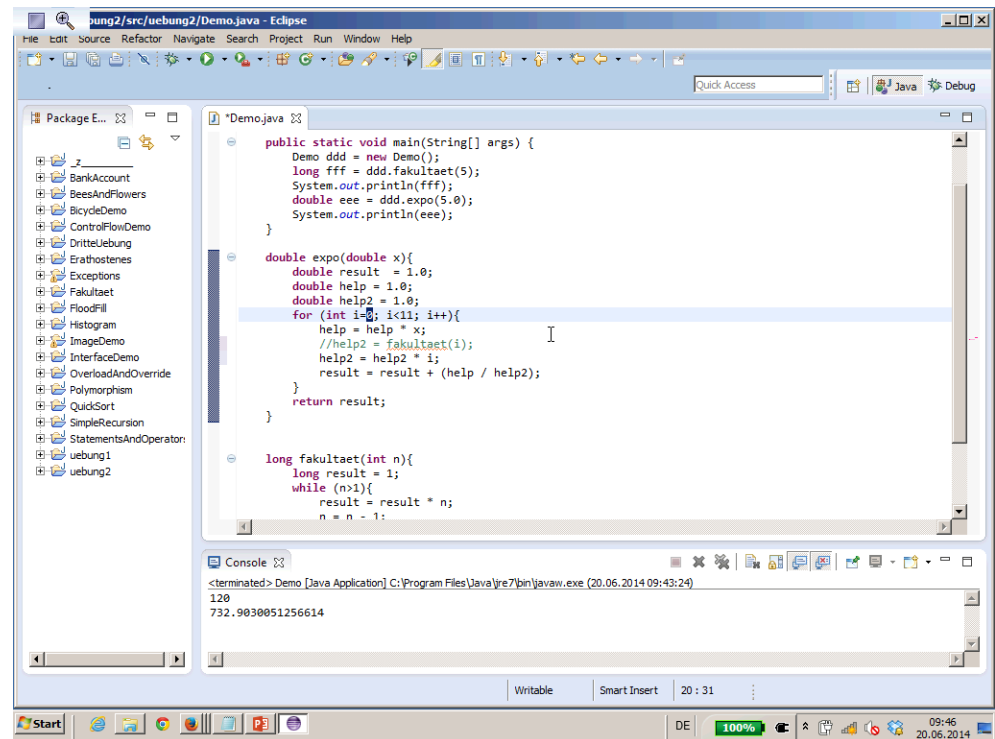
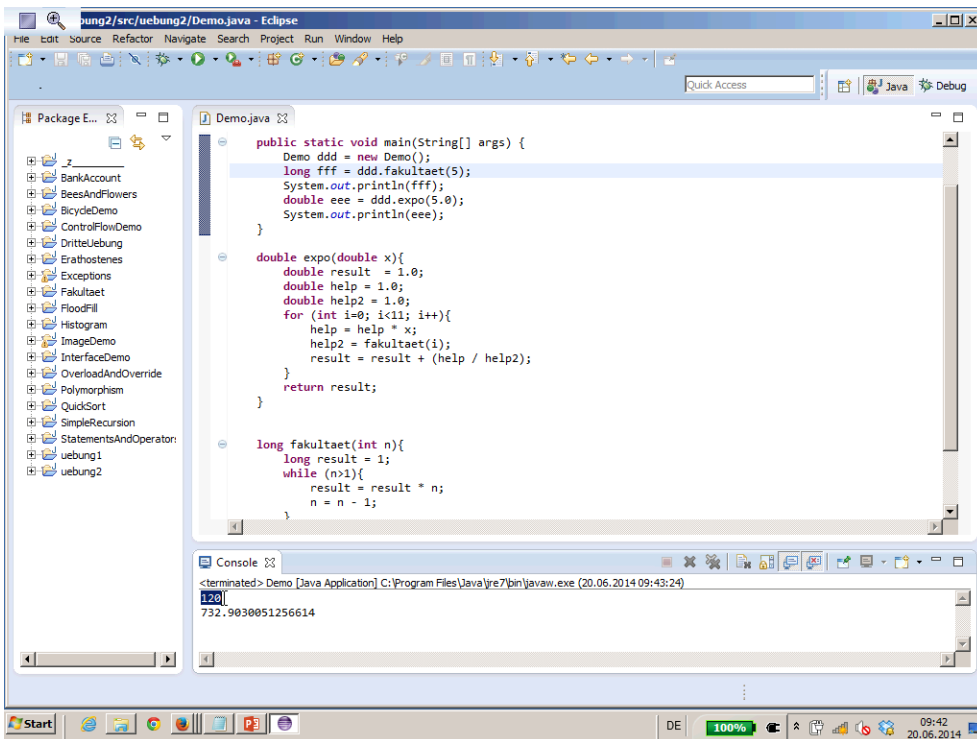
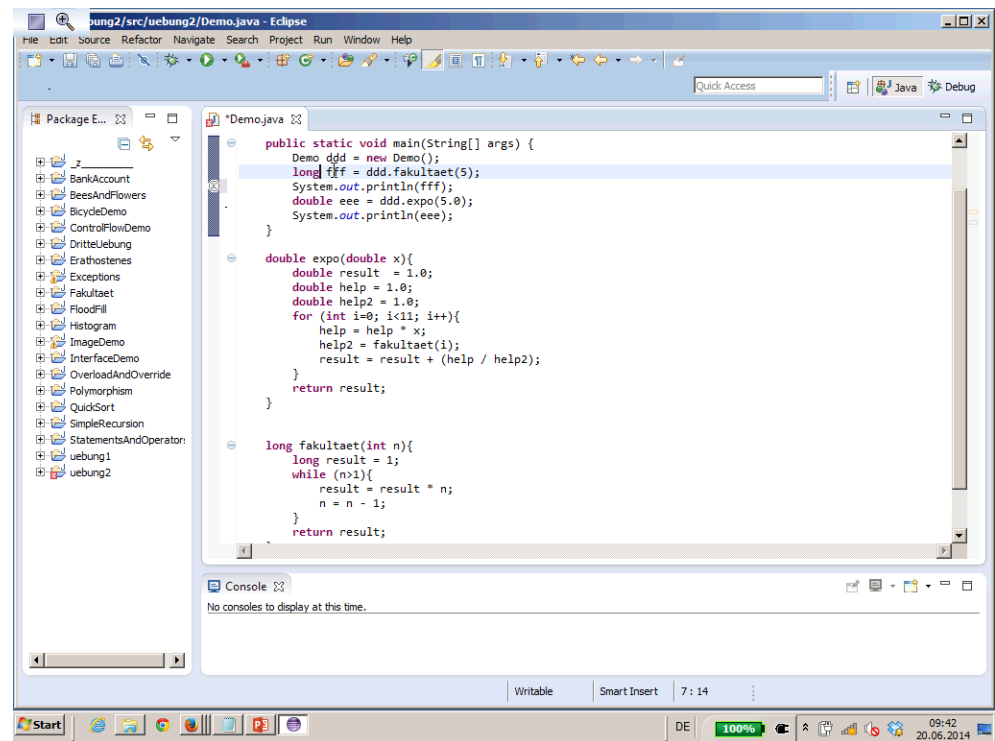
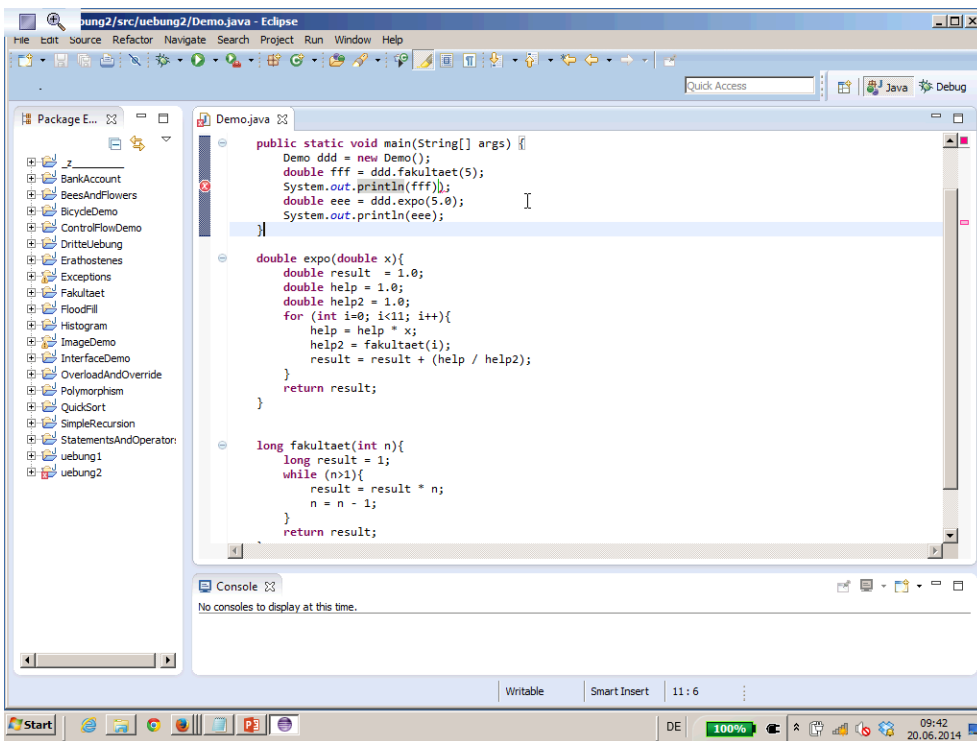
double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=0; i<11; i++){
        help = help * x;
        help2 = fakultaet(i);
        result = result + (help / help2);
    }
    return result;
}

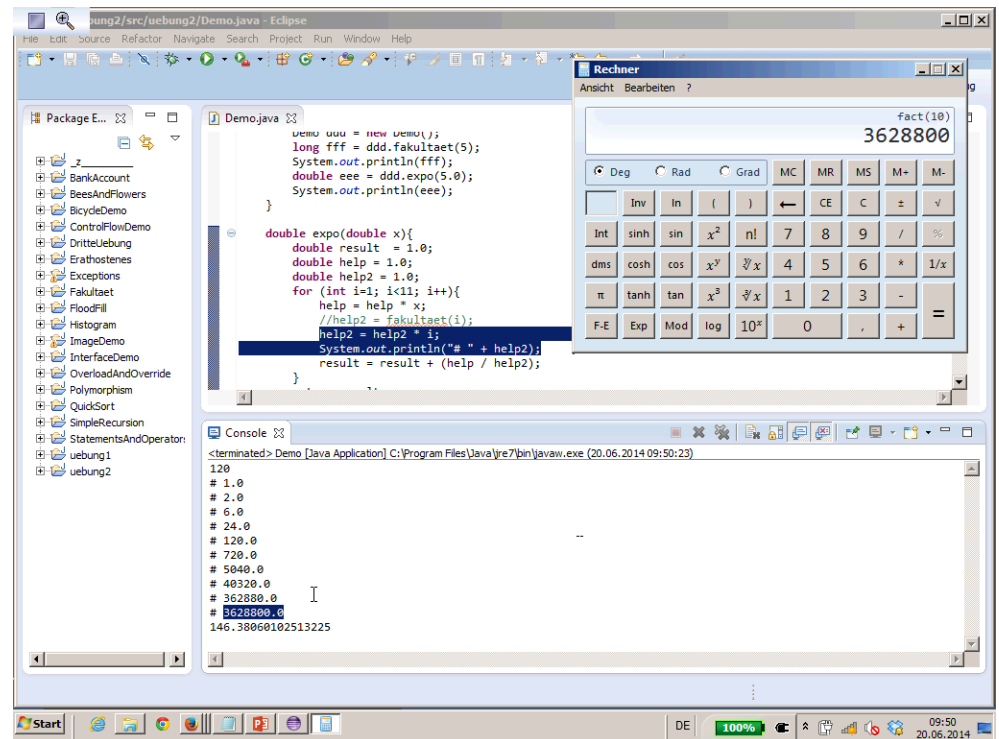
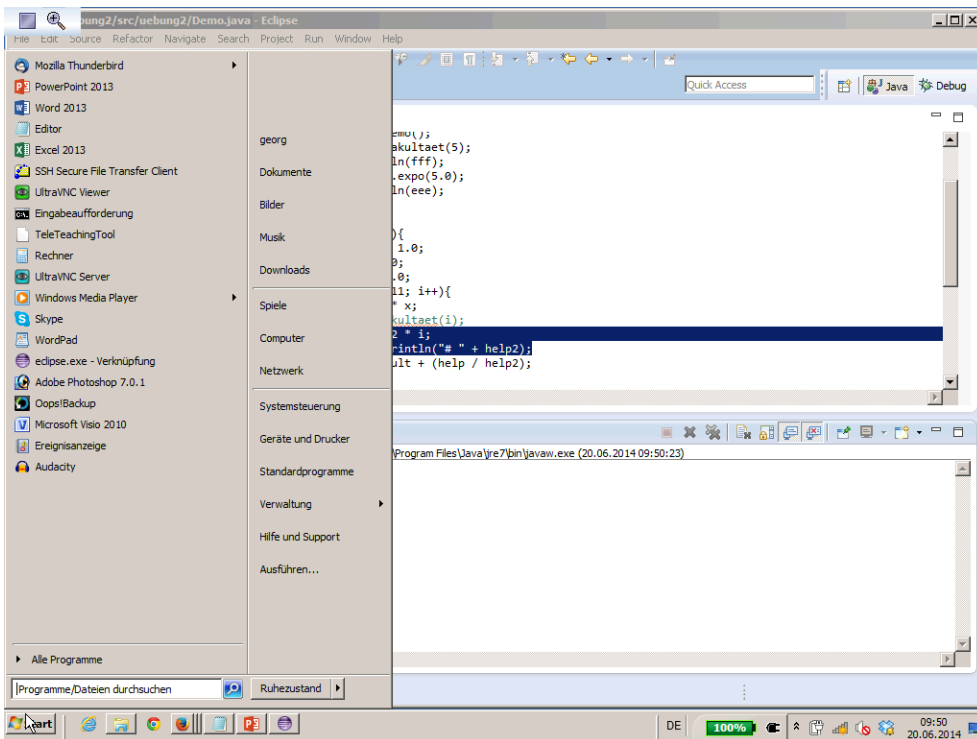
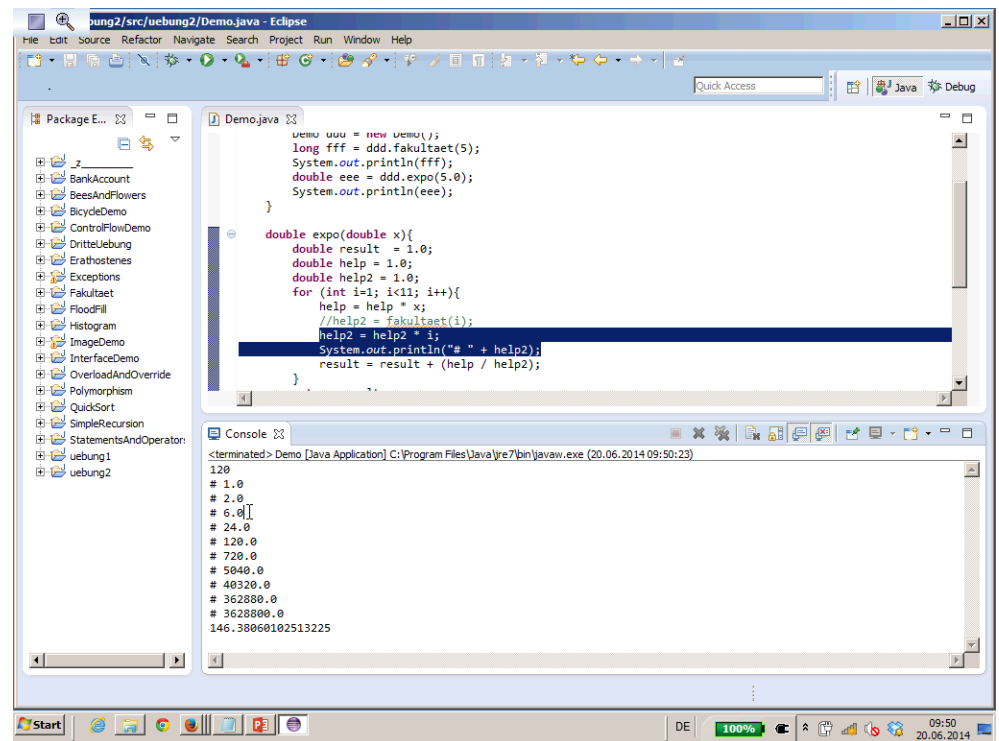
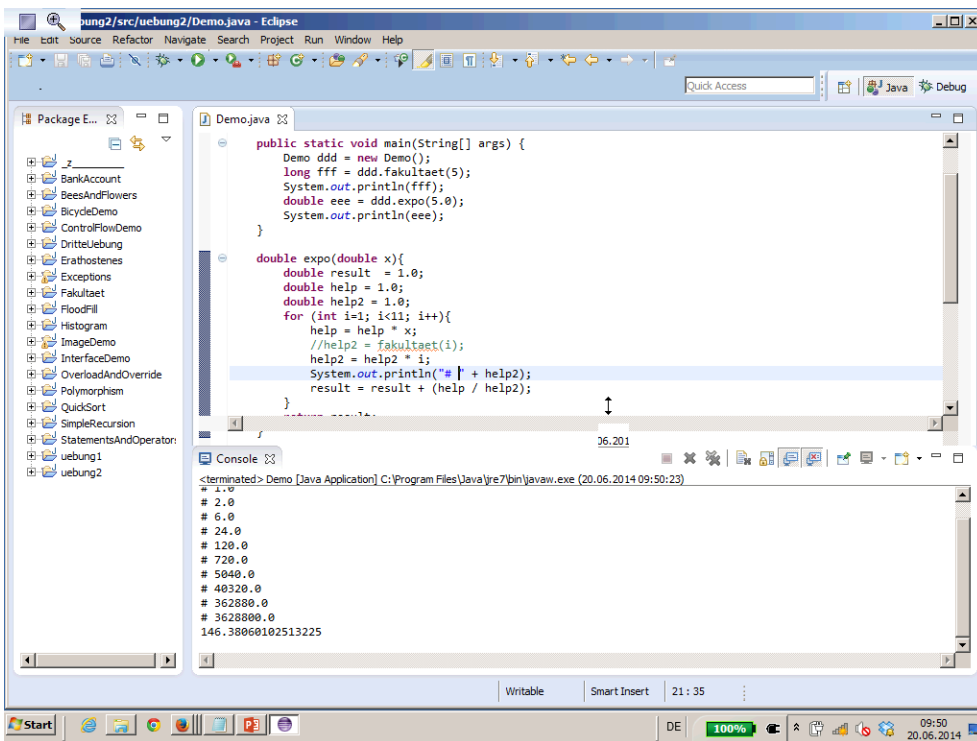
long fakultaet(int n){
    long result = 1;
    while (n>1){
        result = result * n;
        n = n - 1;
    }
    return result;
}
```

```
public static void main(String[] args) {
    Demo ddd = new Demo();
    double fff = ddd.fakultaet(5);
    System.out.println(fff);
    double eee = ddd.expo(5.0);
    System.out.println(eee);
}

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=0; i<11; i++){
        help = help * x;
        help2 = fakultaet(i);
        result = result + (help / help2);
    }
    return result;
}

long fakultaet(int n){
    long result = 1;
    while (n>1){
        result = result * n;
        n = n - 1;
    }
    return result;
}
```





Rechner

fact(10)
3628800

```

Demojava
long fff = ddd.fakultaet(5);
System.out.println(fff);
double eee = ddd.expo(5.0);
System.out.println(eee);

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=1; i<11; i++){
        help = help * x;
        //help2 = fakultaet(i);
        help2 = help2 * i;
        System.out.println("# " + help2);
        result = result + (help / help2);
    }
}

```

Console

```

<terminated> Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 09:50:23)
120
# 1.0
# 2.0
# 6.0
# 24.0
# 120.0
# 720.0
# 5040.0
# 40320.0
# 362880.0
# 3628800.0
146.38060102513225

```

```

Demojava
long fff = ddd.fakultaet(5);
System.out.println(fff);
double eee = ddd.expo(5.0);
System.out.println(eee);

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=1; i<11; i++){
        help = help * x;
        //help2 = fakultaet(i);
        help2 = help2 * i;
        System.out.println("# " + help2);
        result = result + (help / help2);
    }
}

```

Console

```

<terminated> Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 09:50:23)
120
# 1.0
# 2.0
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# 24.0
# 120.0
# 720.0
# 5040.0
# 40320.0
# 362880.0
# 3628800.0
146.38060102513225

```

Rechner

powe(5)
148,41315910257660342111558004055

```

Demojava
long fff = ddd.fakultaet(5);
System.out.println(fff);
double eee = ddd.expo(5.0);
System.out.println(eee);

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=1; i<21; i++){
        help = help * x;
        //help2 = fakultaet(i);
        help2 = help2 * i;
        System.out.println("# " + help2);
        result = result + (help / help2);
    }
}

```

Console

```

<terminated> Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 09:52:50)
# 3628800.0
# 3.99168E7
# 4.790016E8
# 6.2270208E9
# 8.71782912E10
# 1.307674368E12
# 2.092278988E13
# 3.55687428996E14
# 6.402373705728E15
# 1.21645100408832E17
# 2.43290200817664E18
148.4131470673818

```

```

Demojava
long fff = ddd.fakultaet(5);
System.out.println(fff);
double eee = ddd.expo(5.0);
System.out.println(eee);

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=1; i<21; i++){
        help = help * x;
        //help2 = fakultaet(i);
        help2 = help2 * i;
        System.out.println("# " + help2);
        result = result + (help / help2);
    }
}

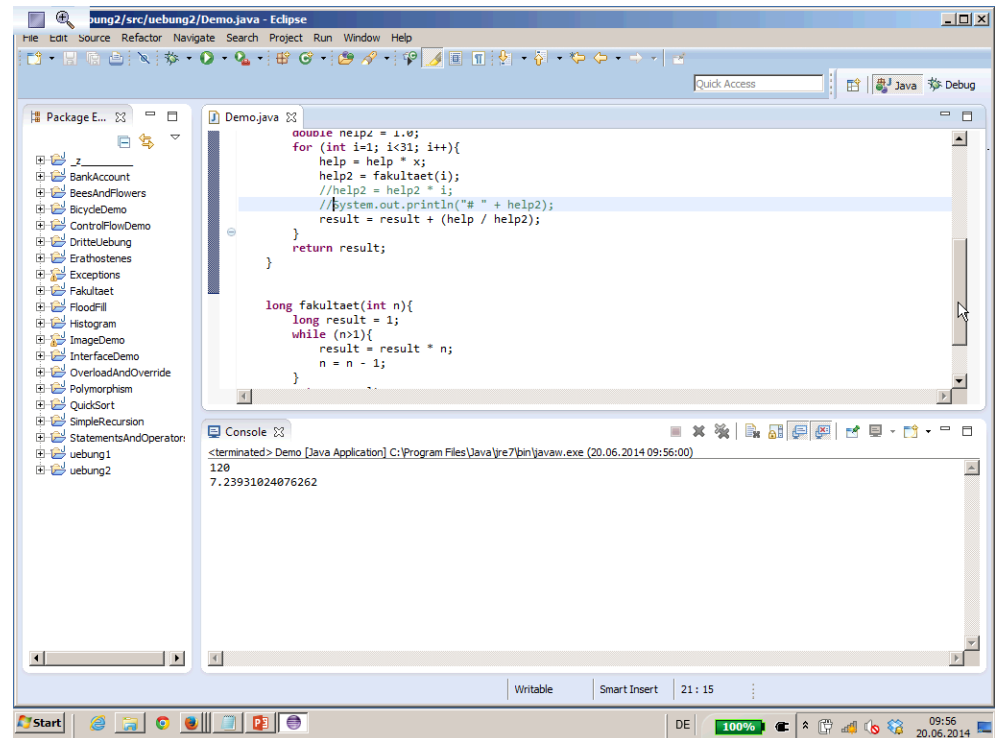
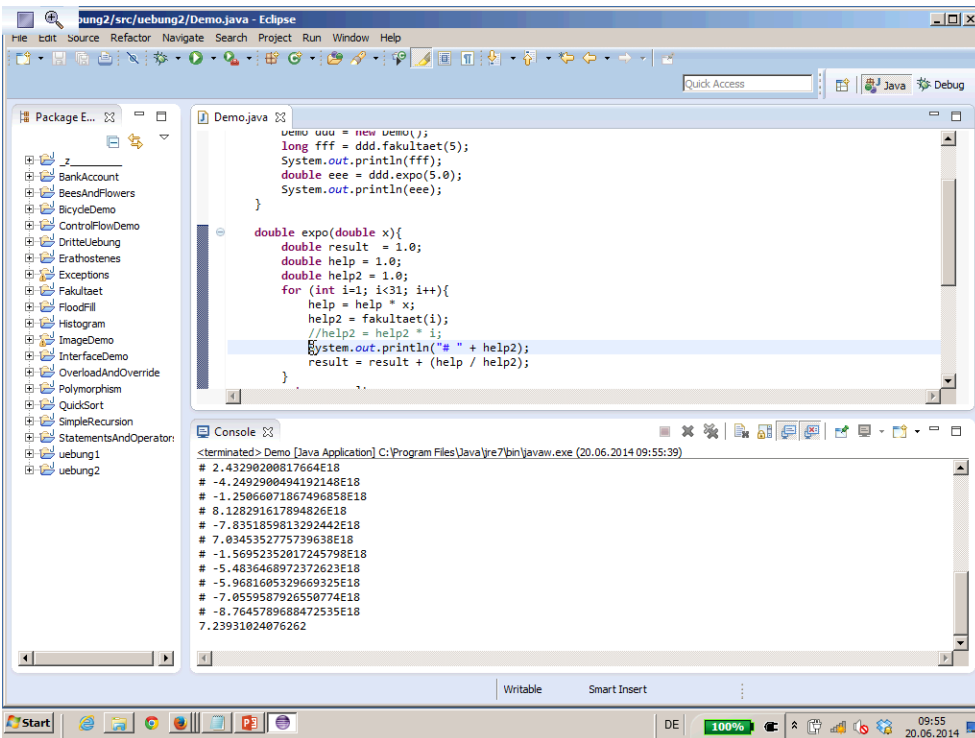
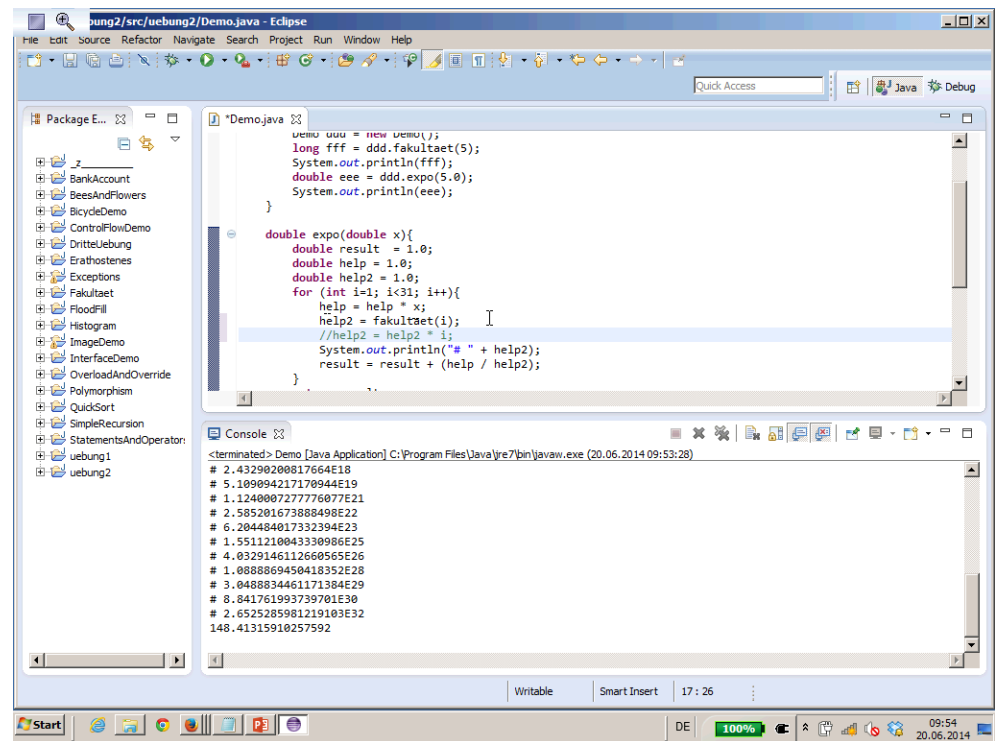
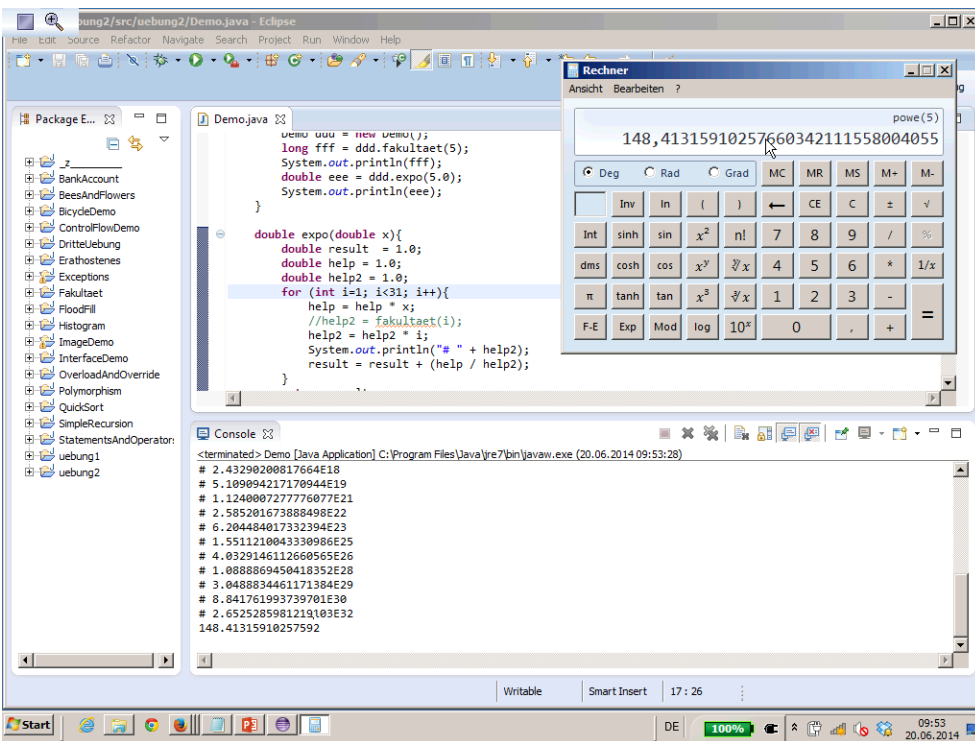
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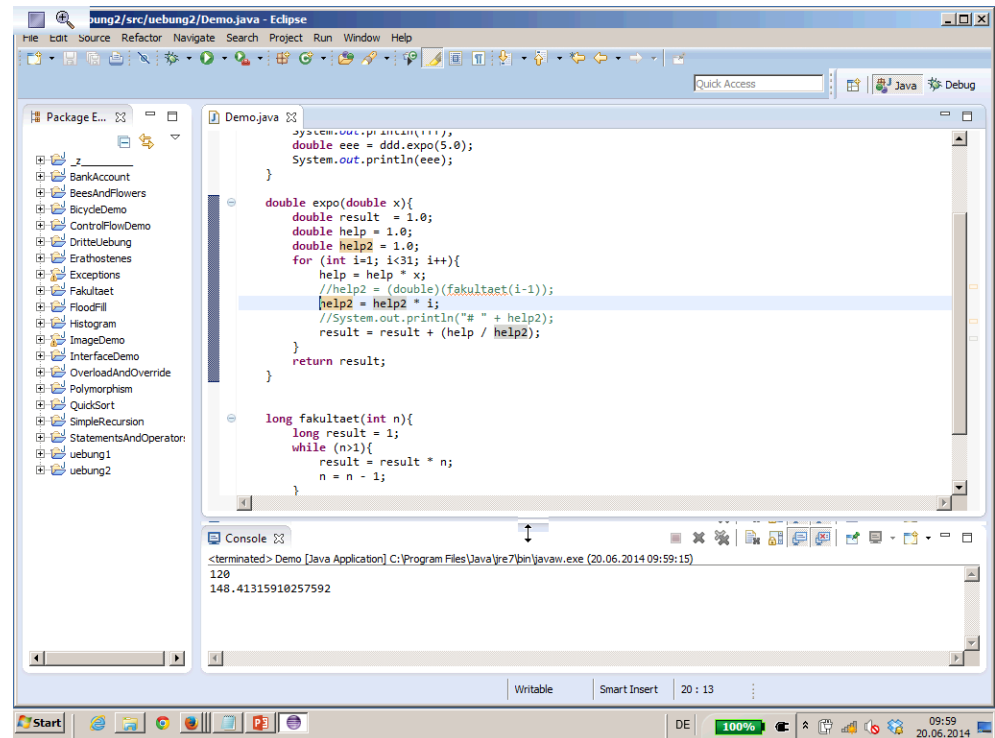
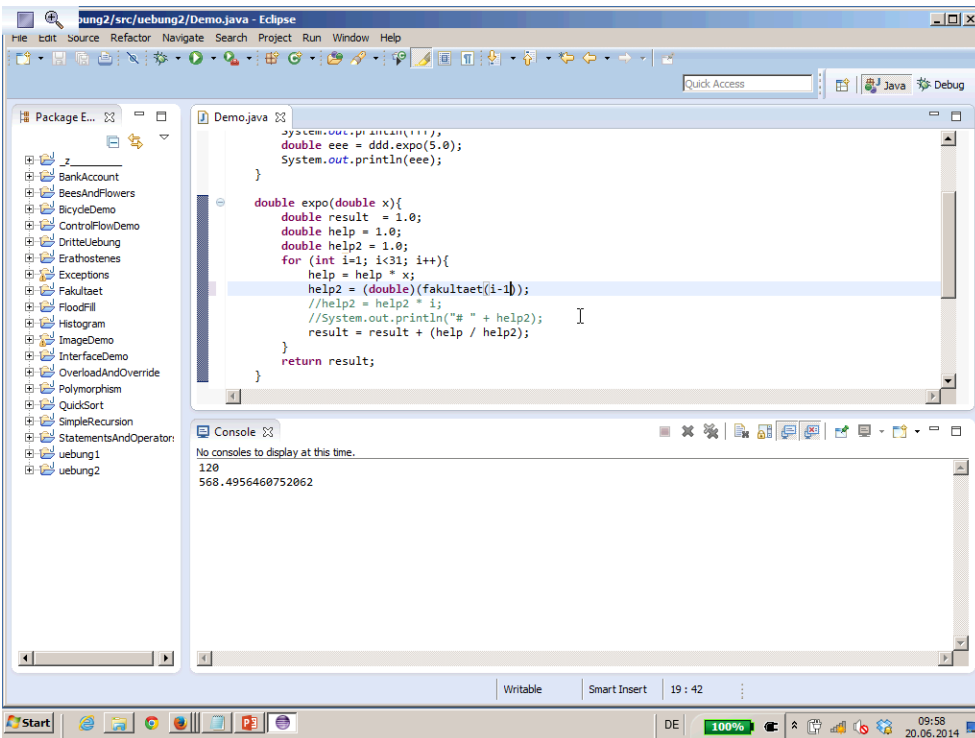
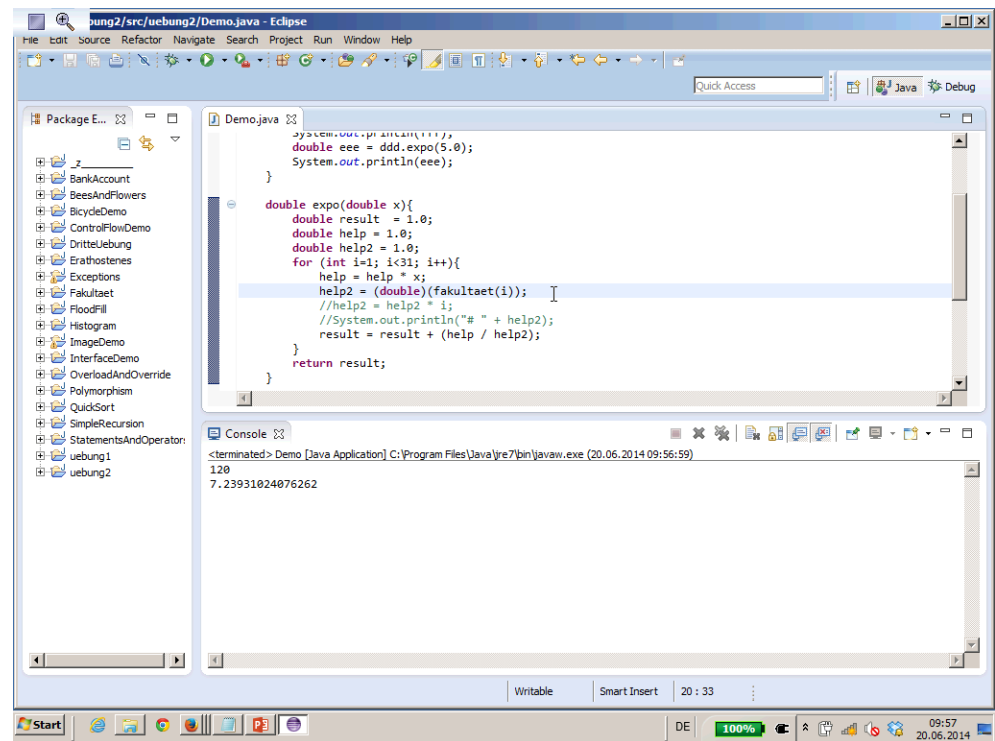
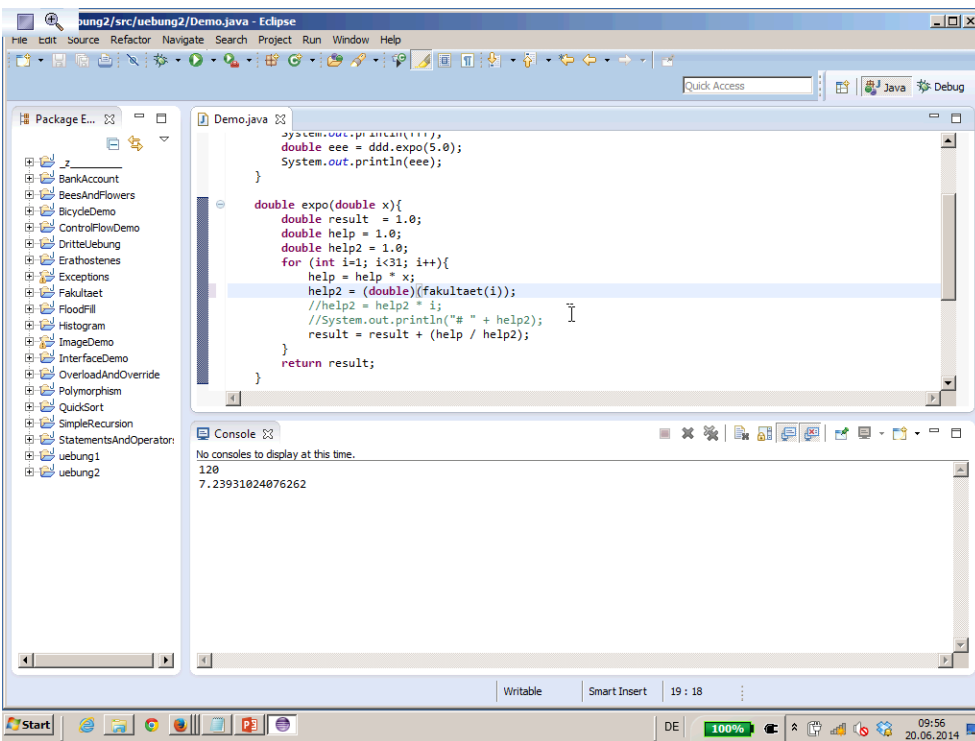
Console

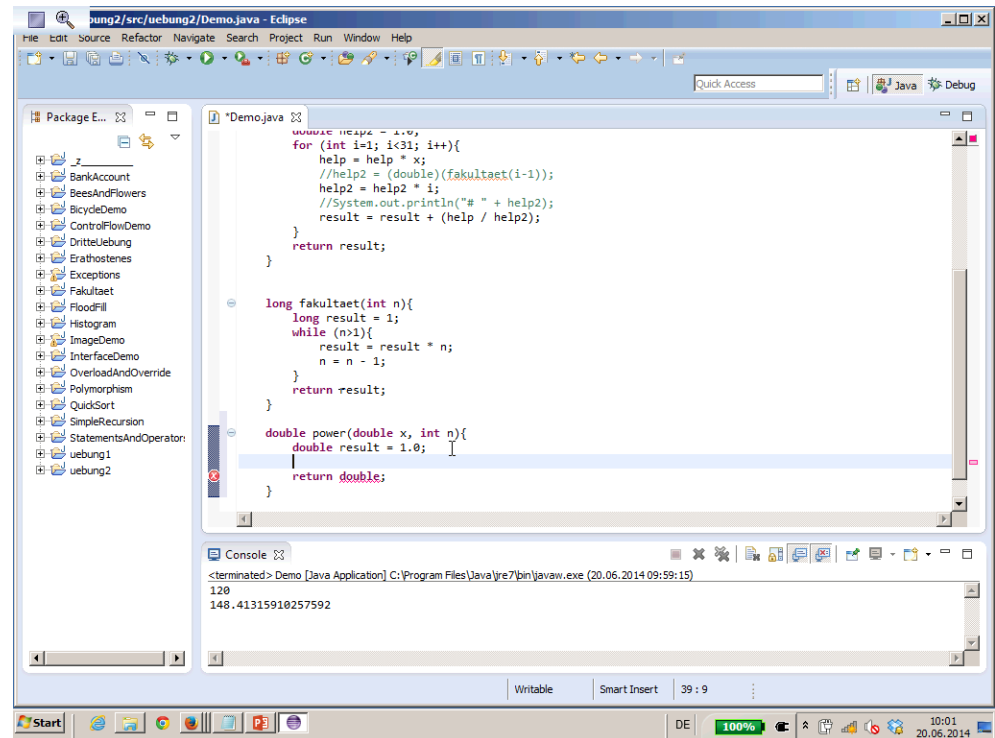
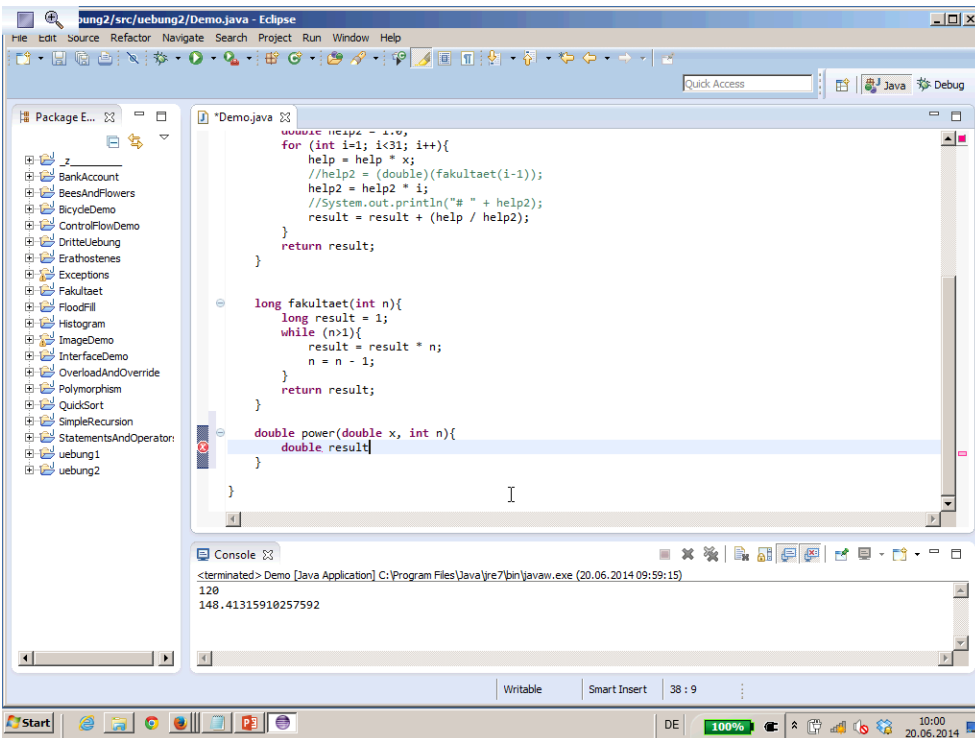
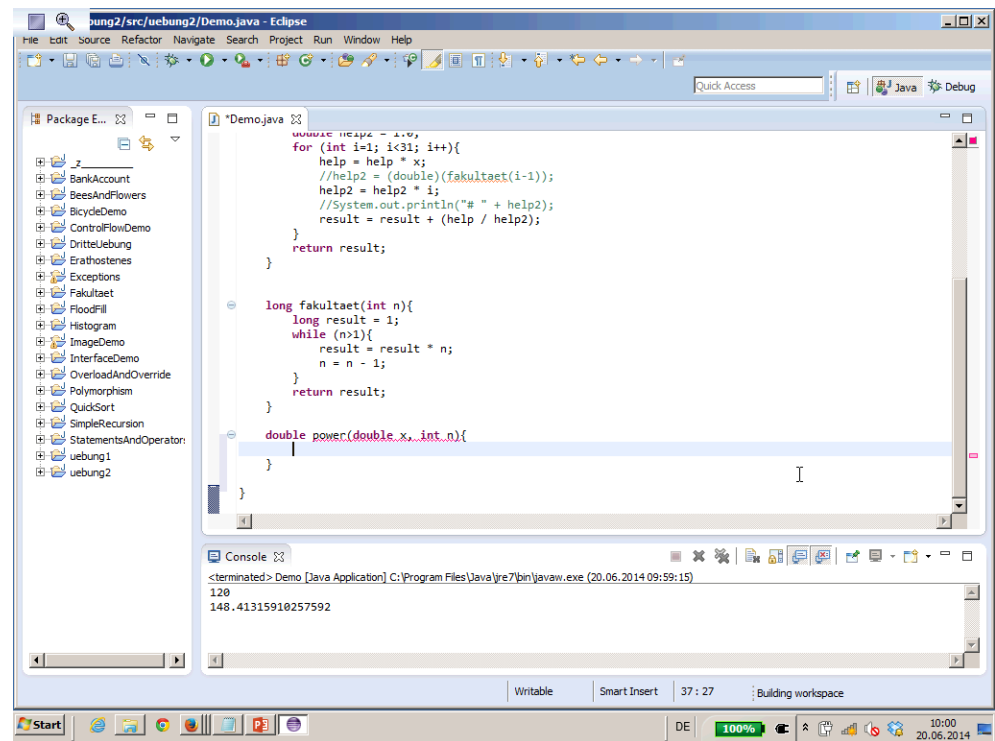
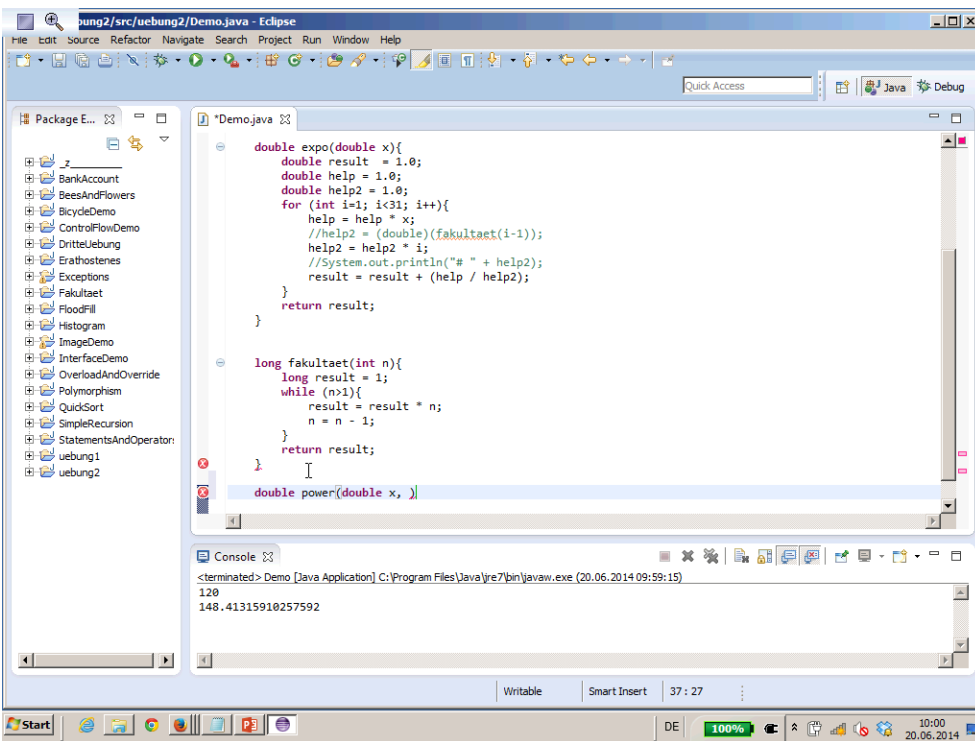
```

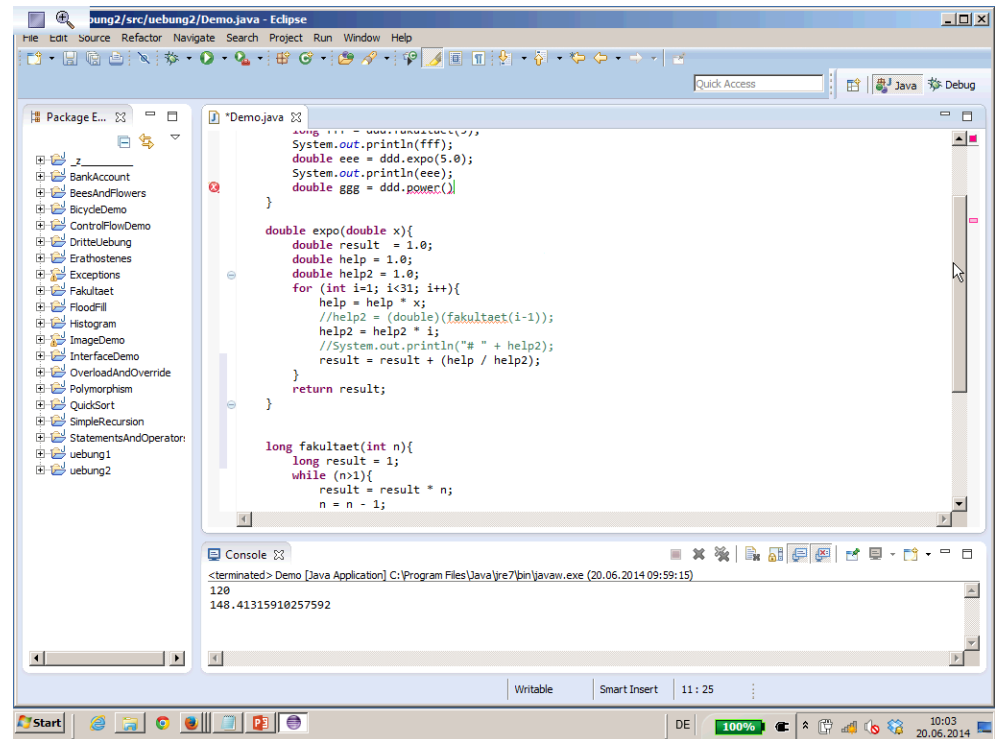
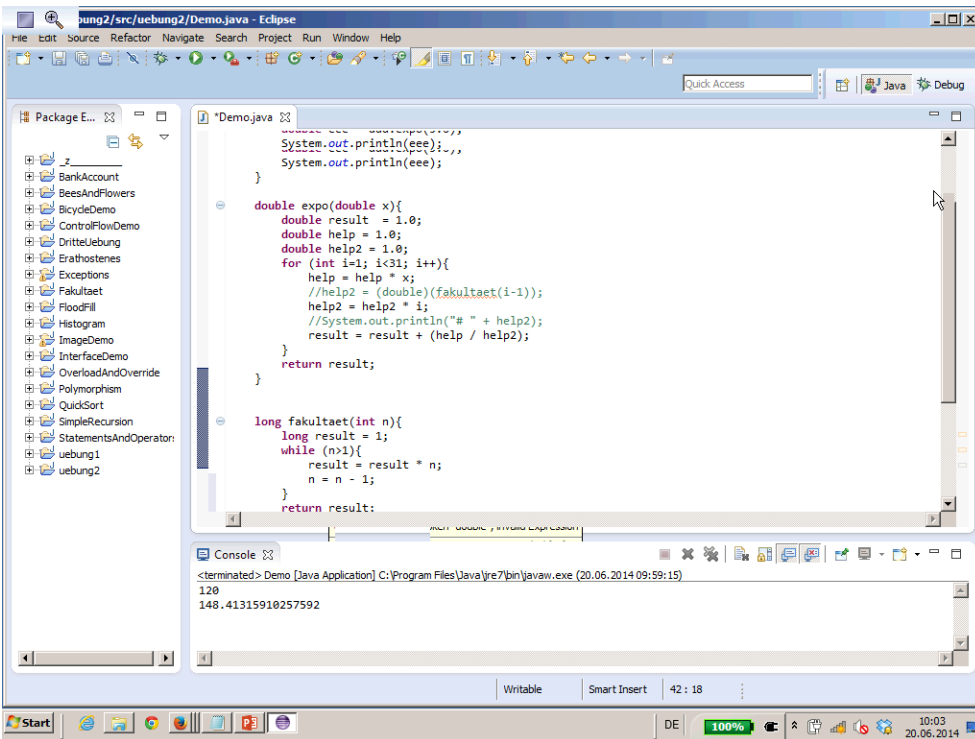
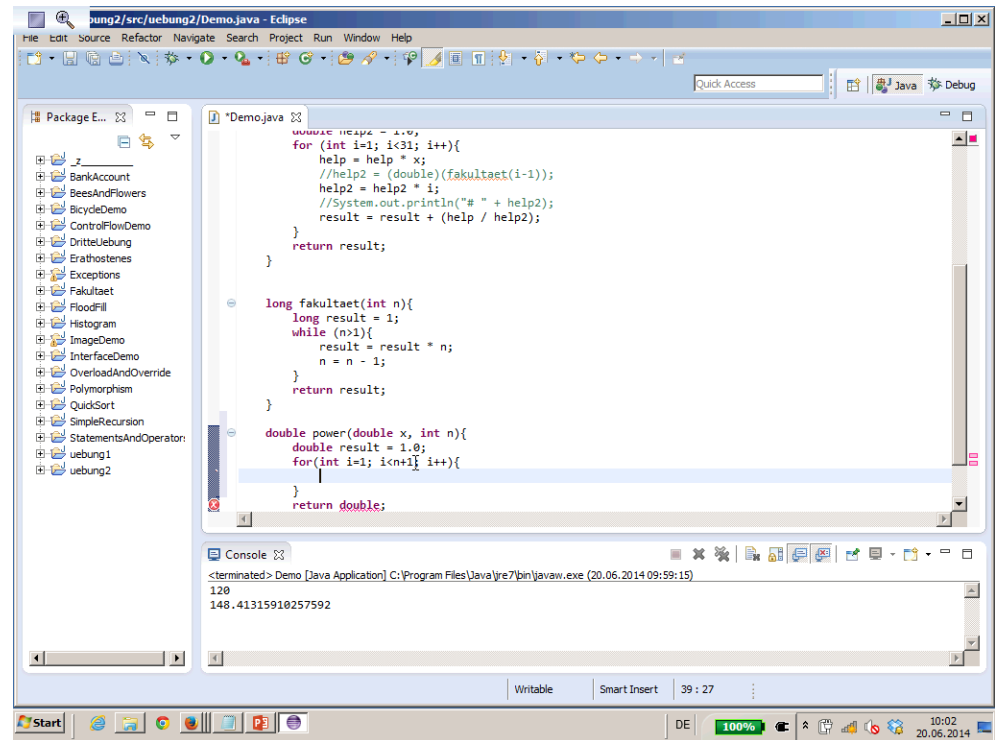
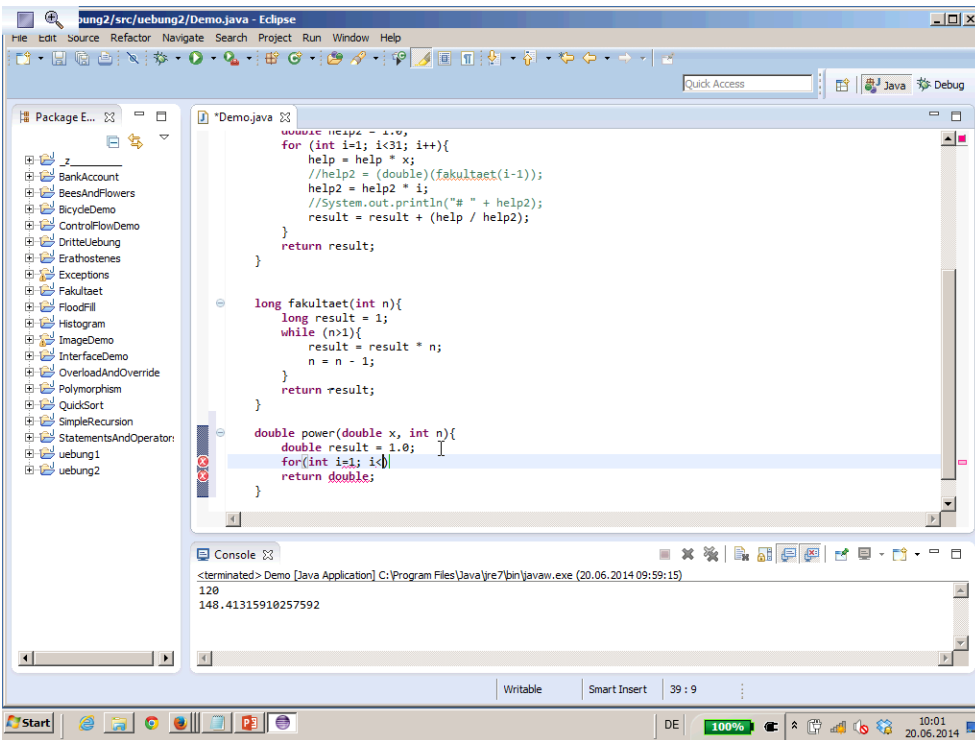
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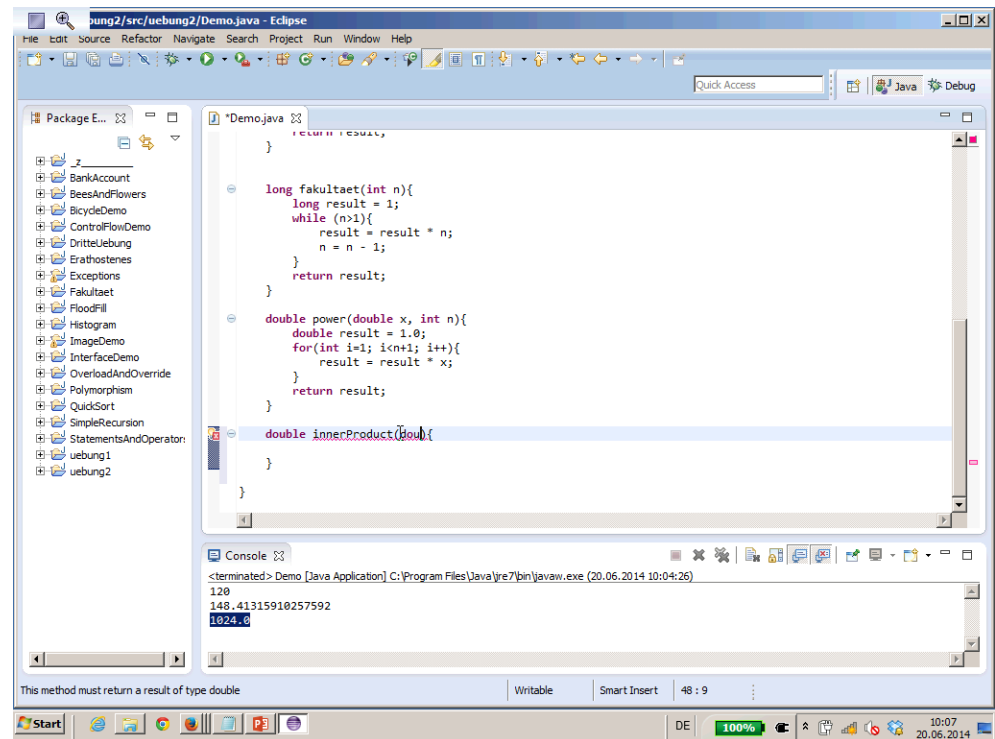
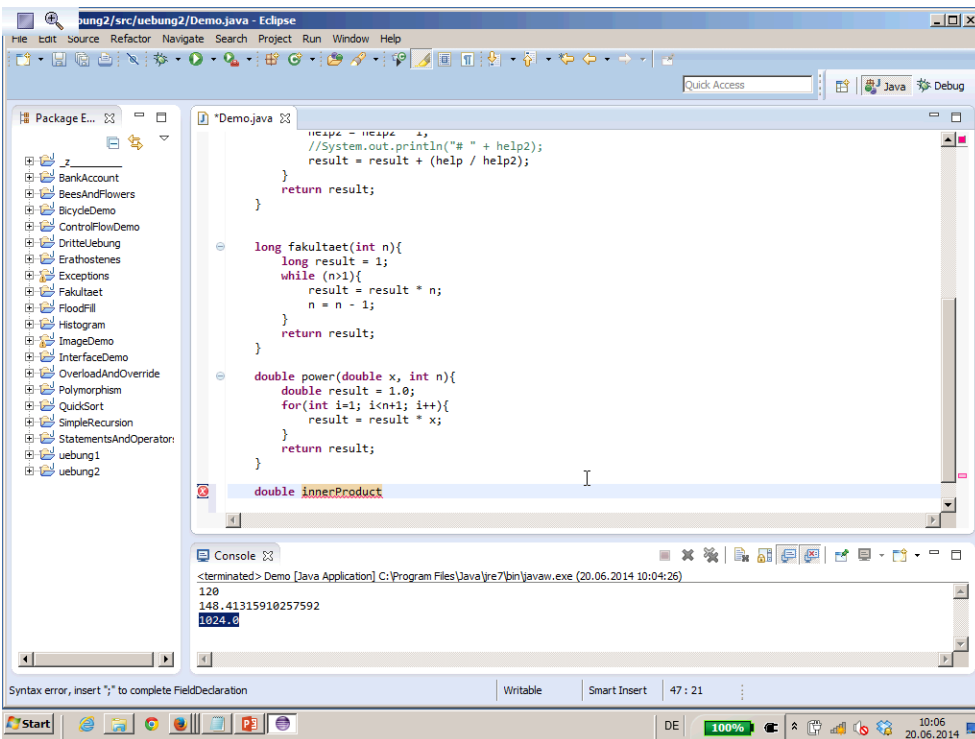
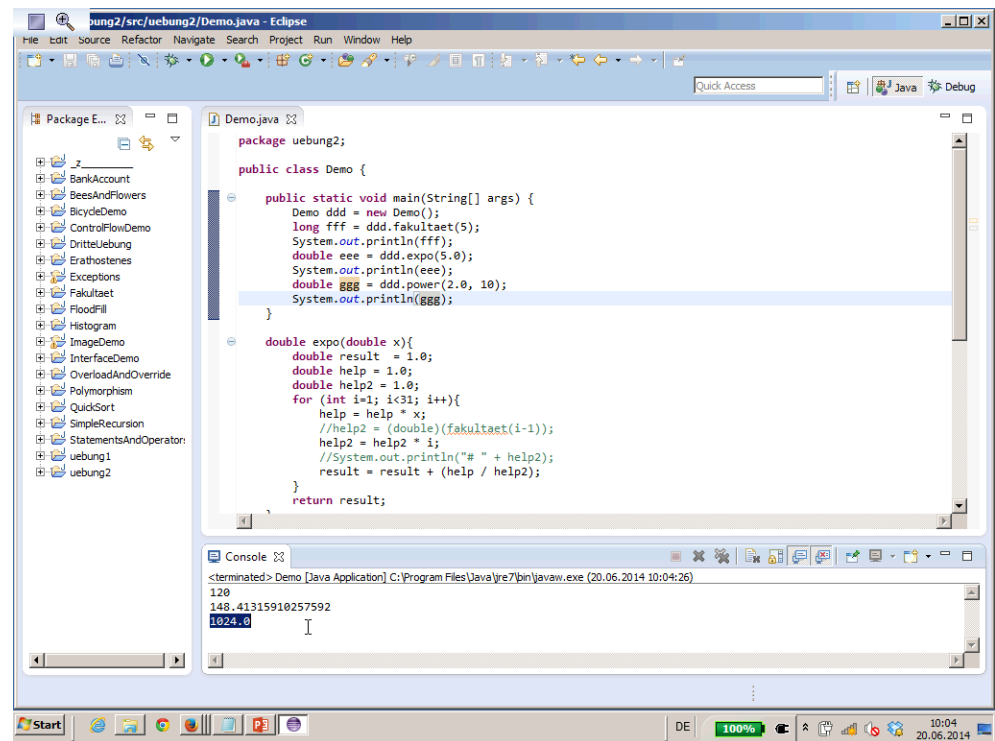
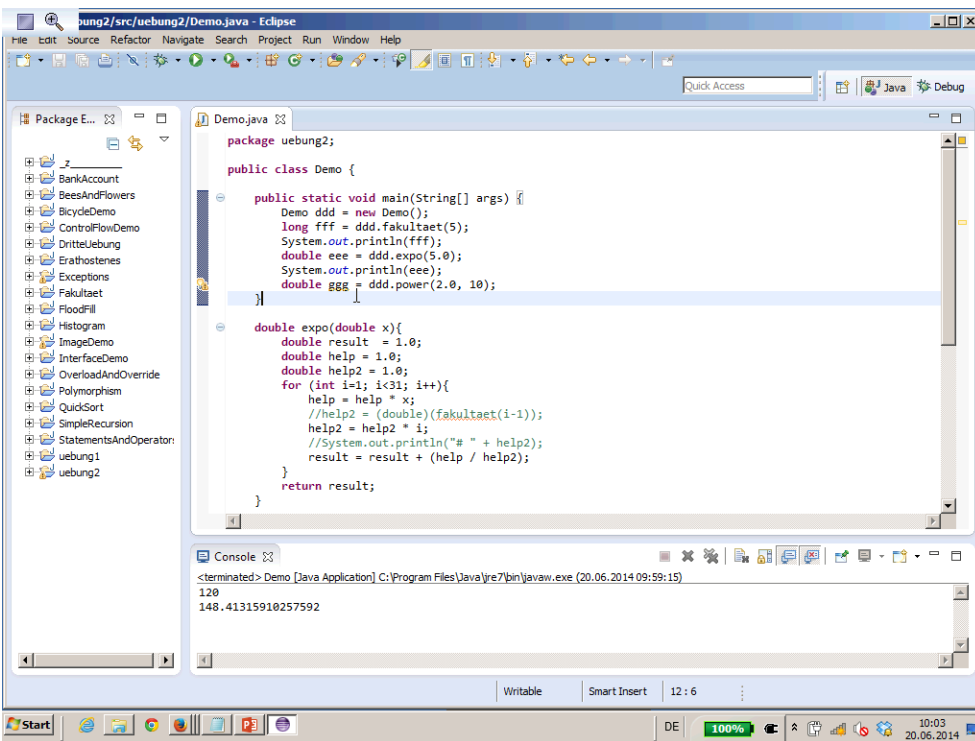
```

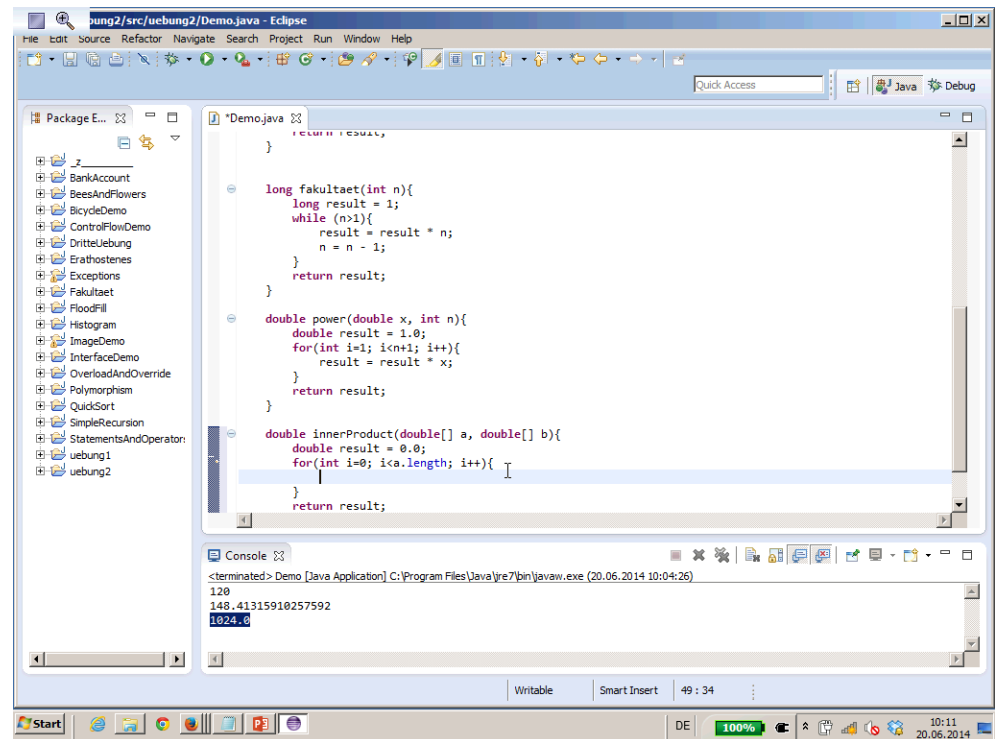
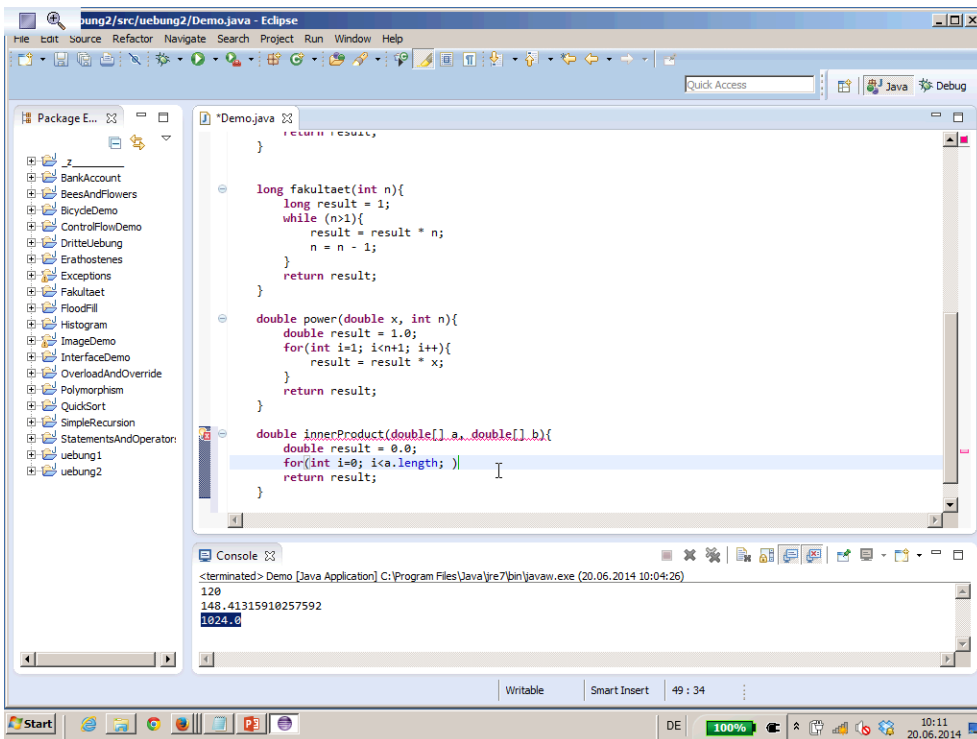
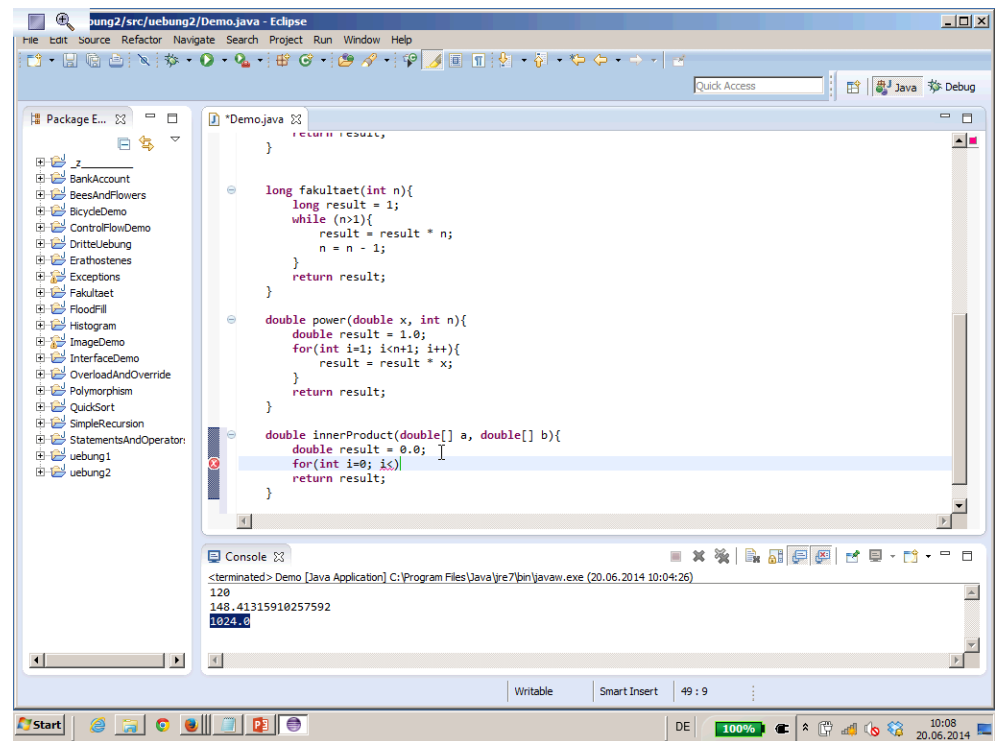
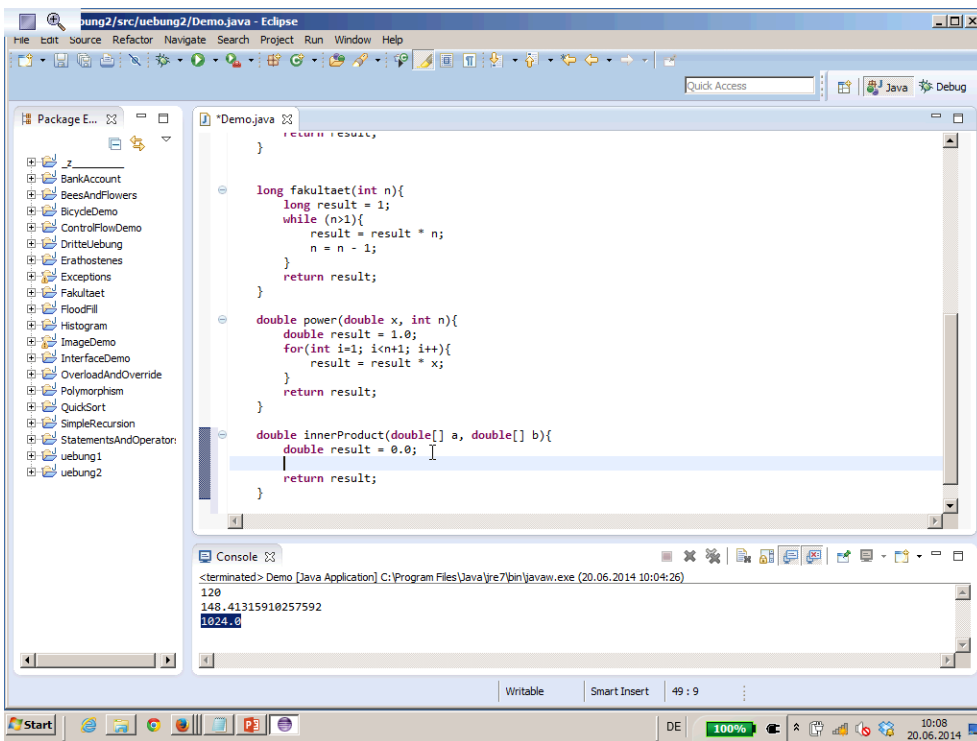


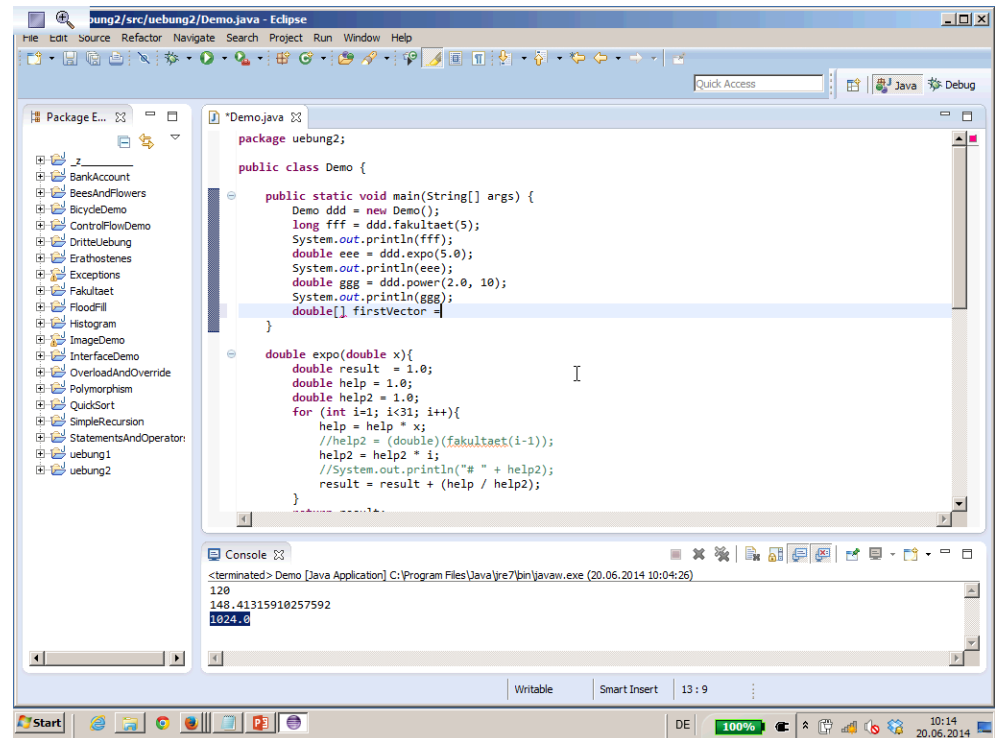
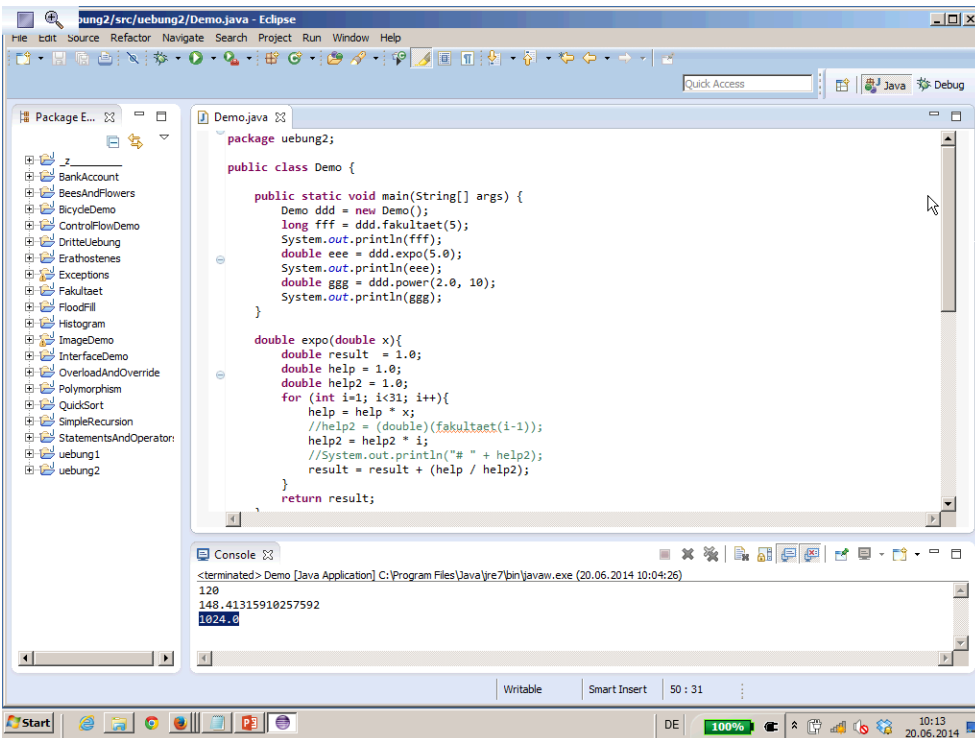
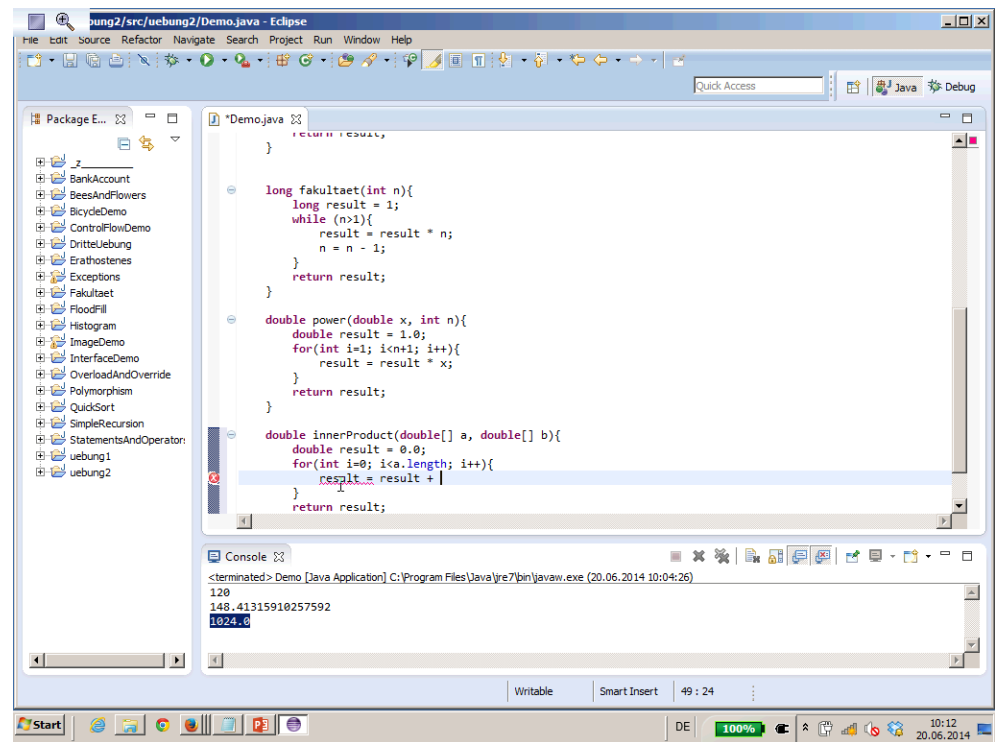
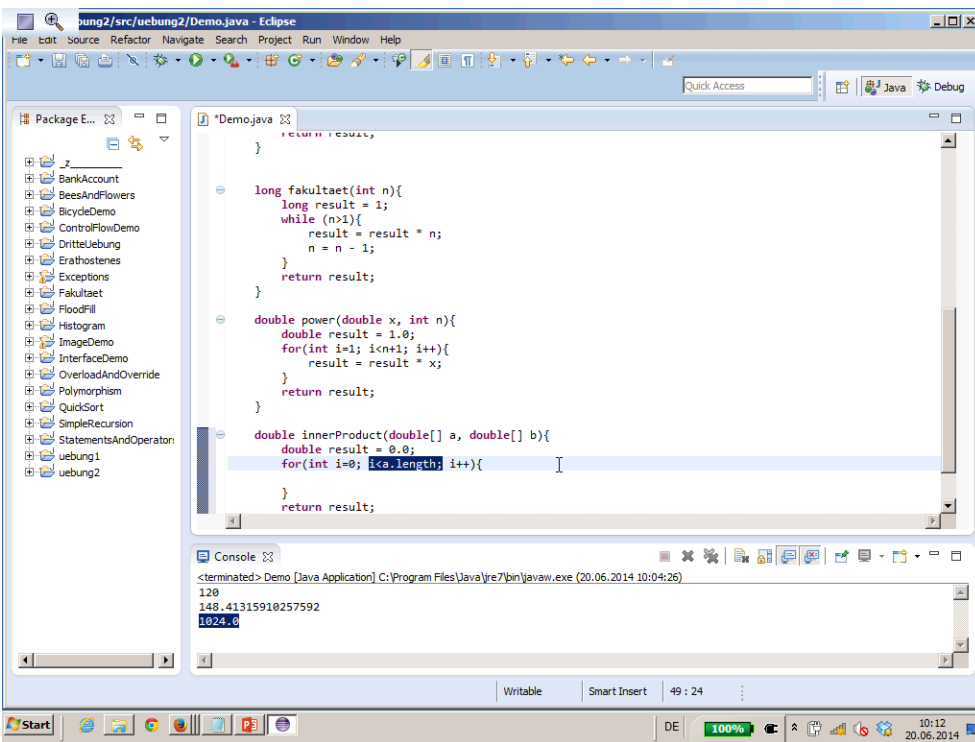


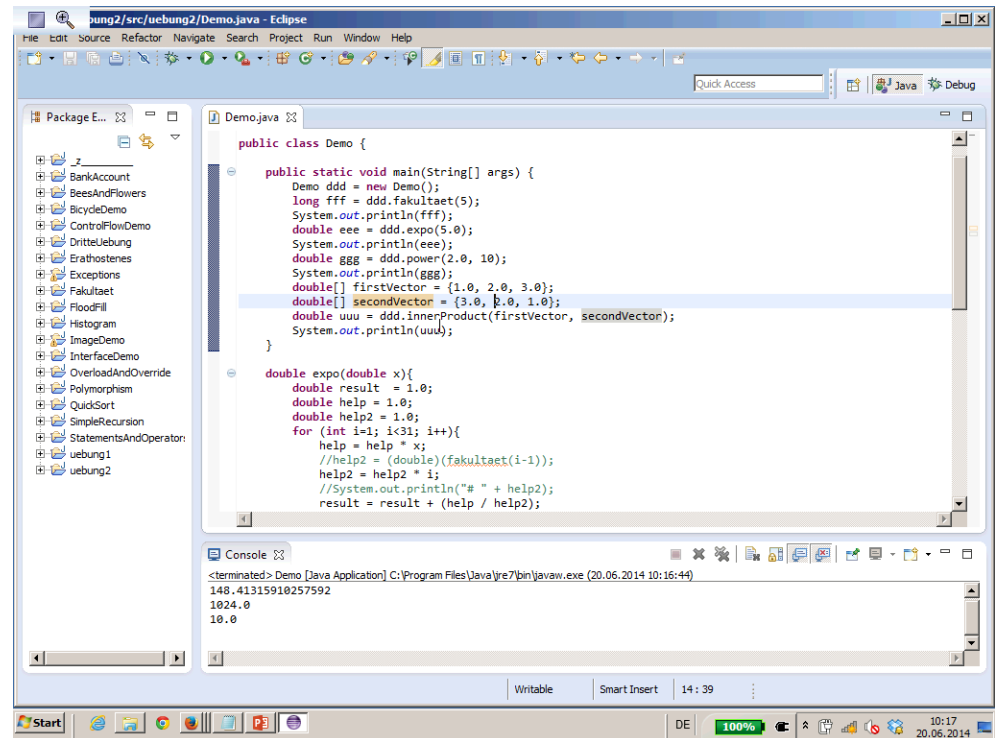
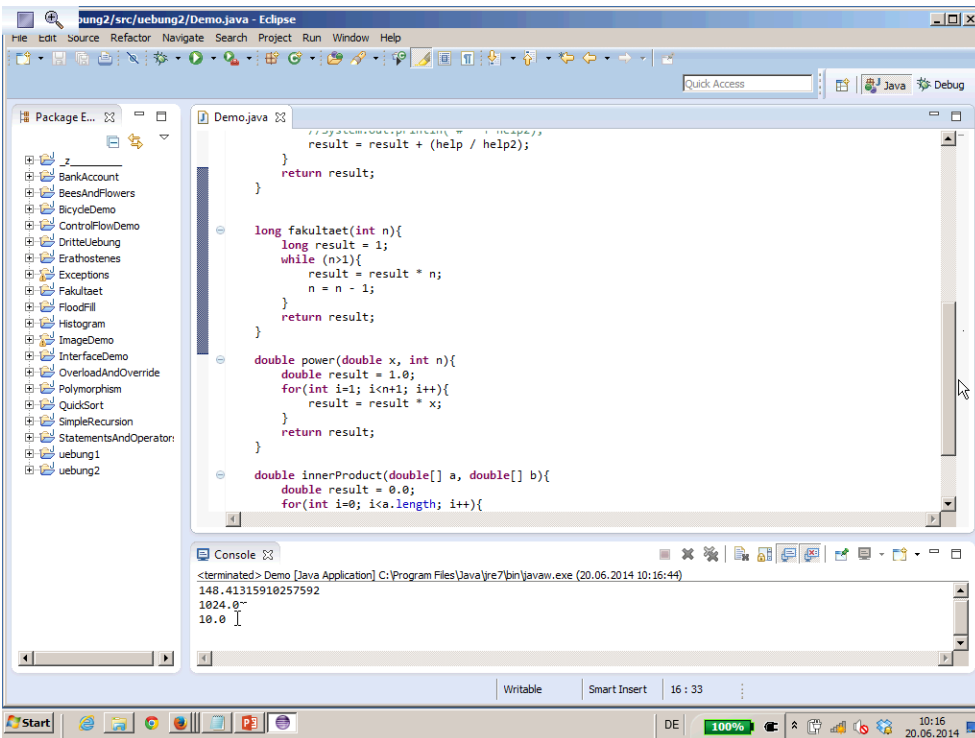
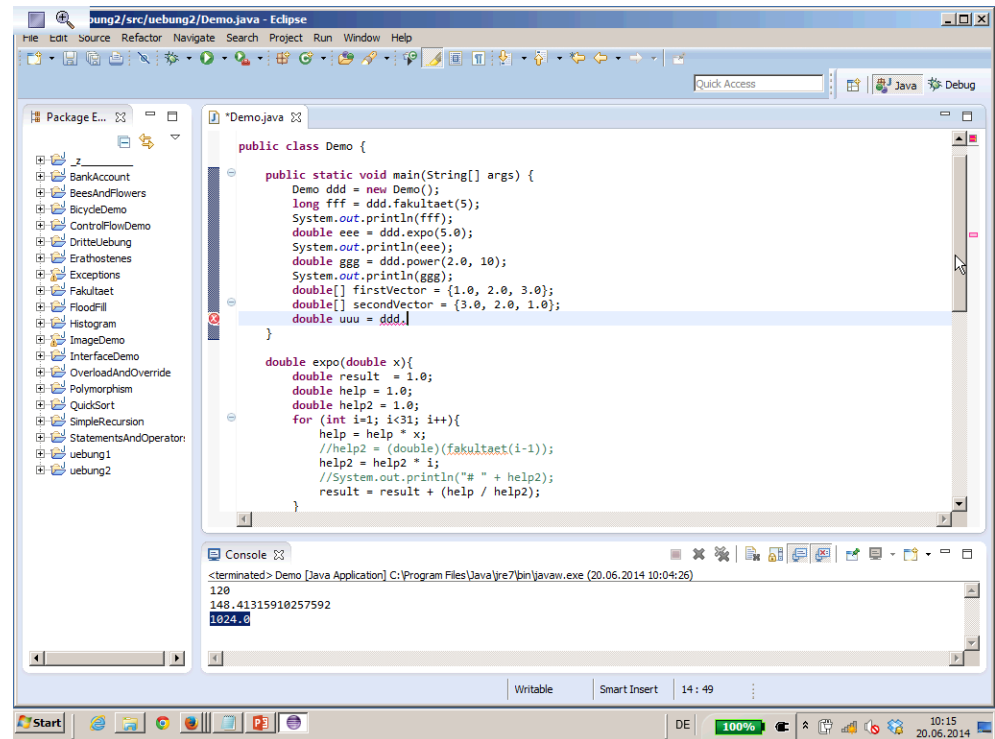
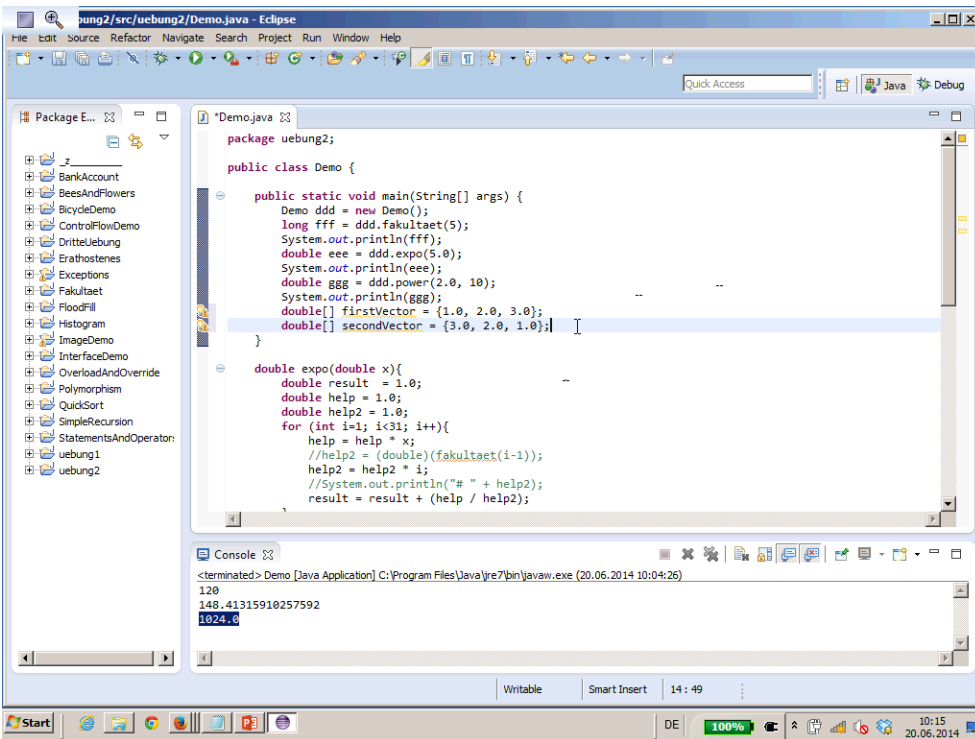


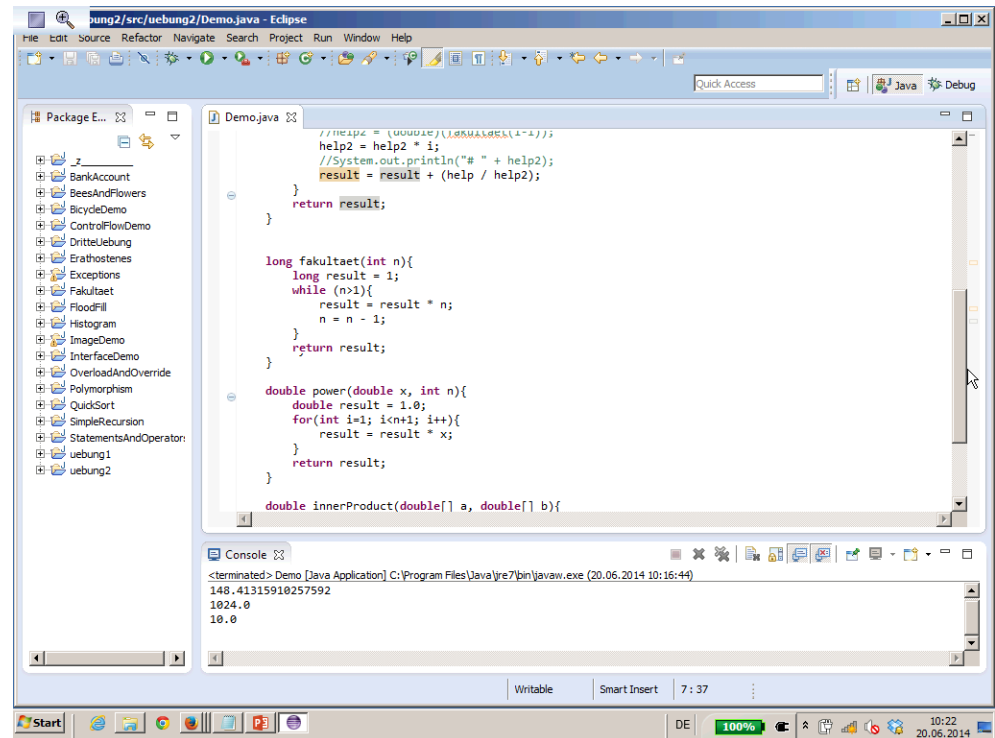
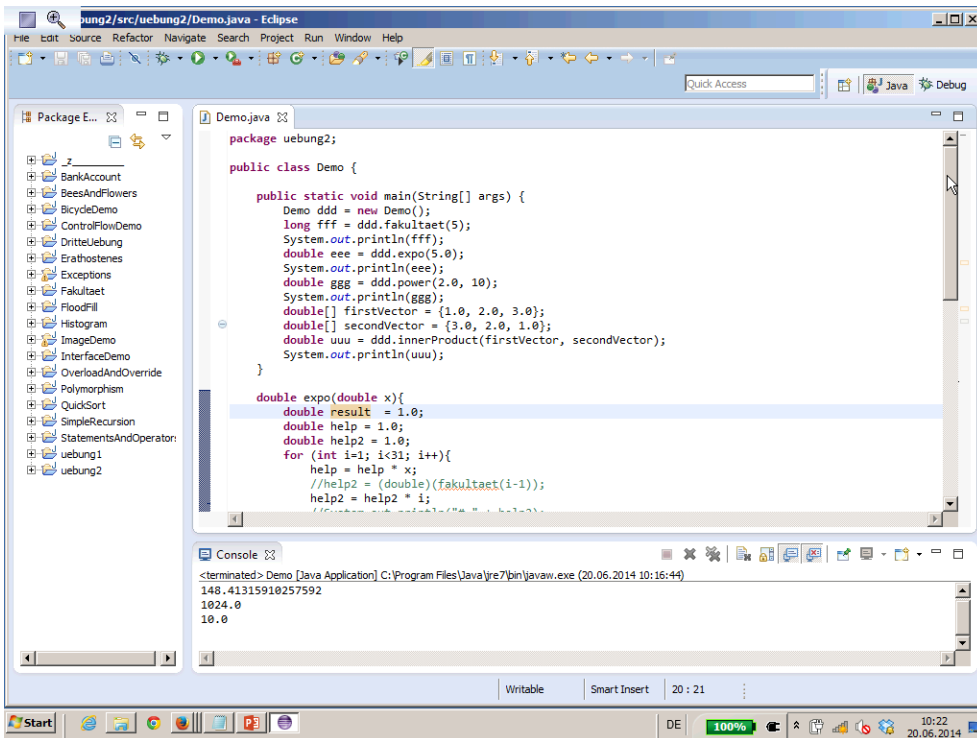
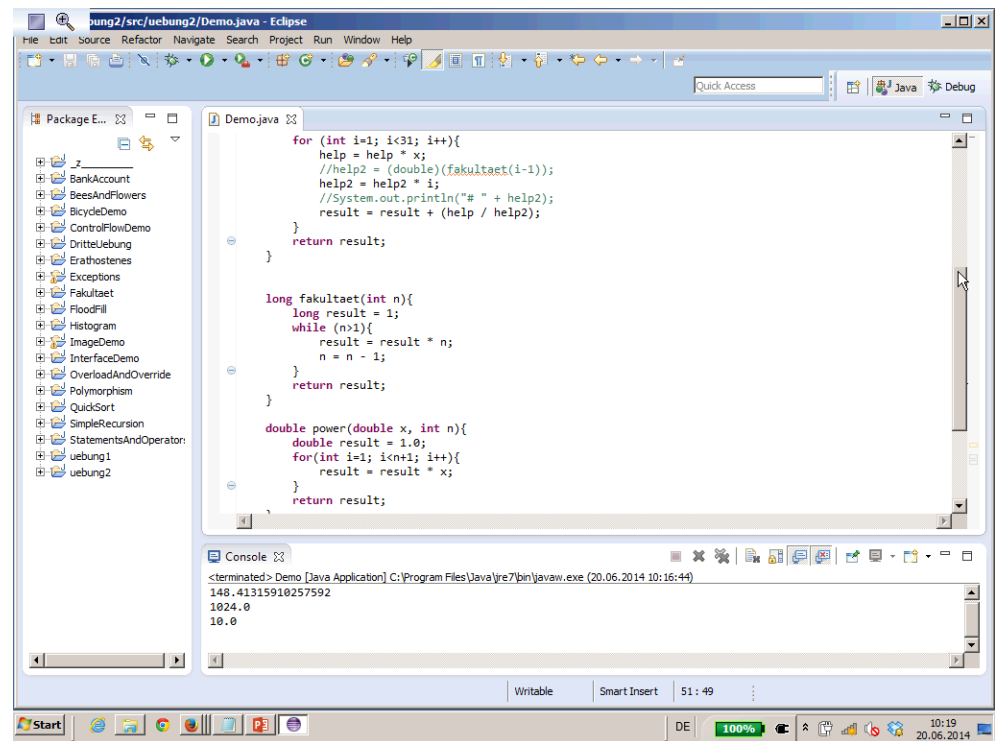
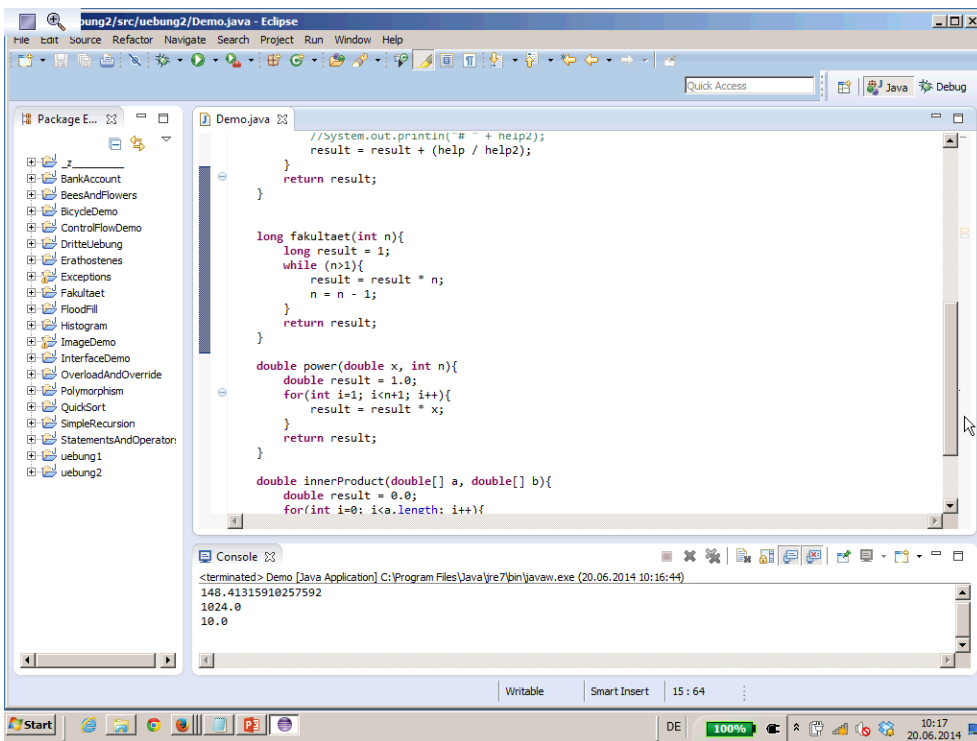


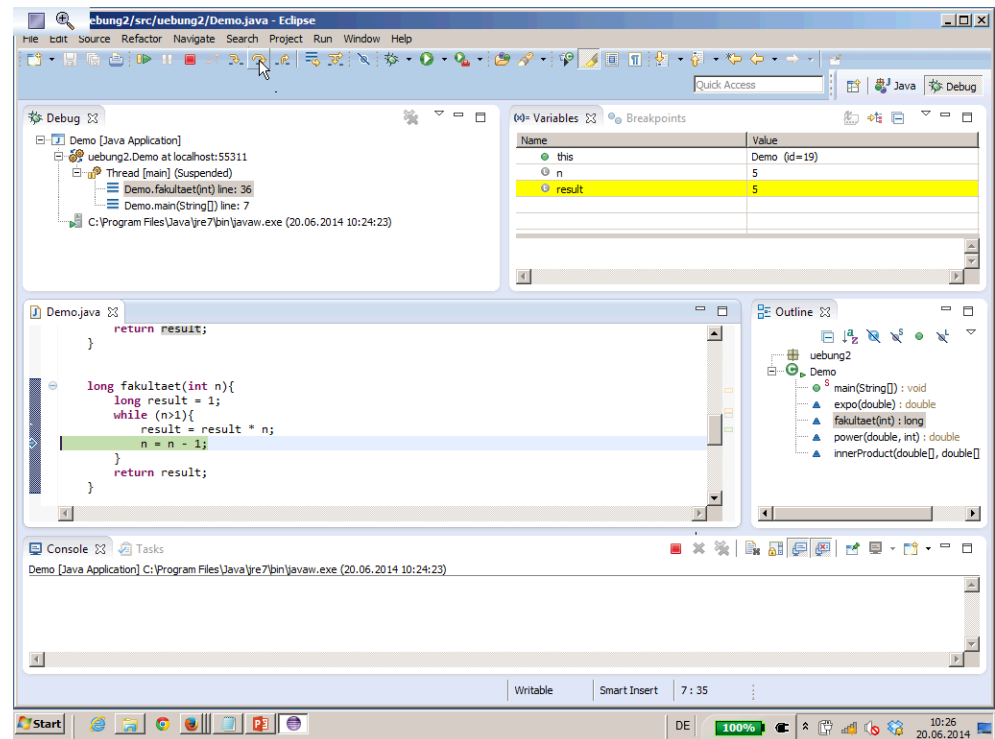
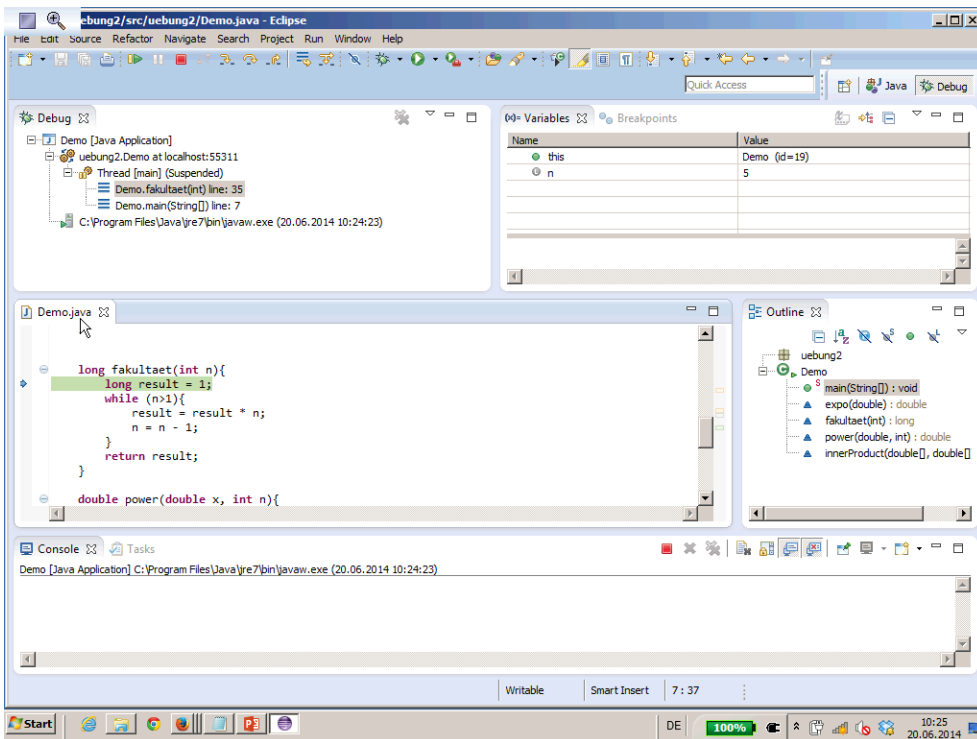
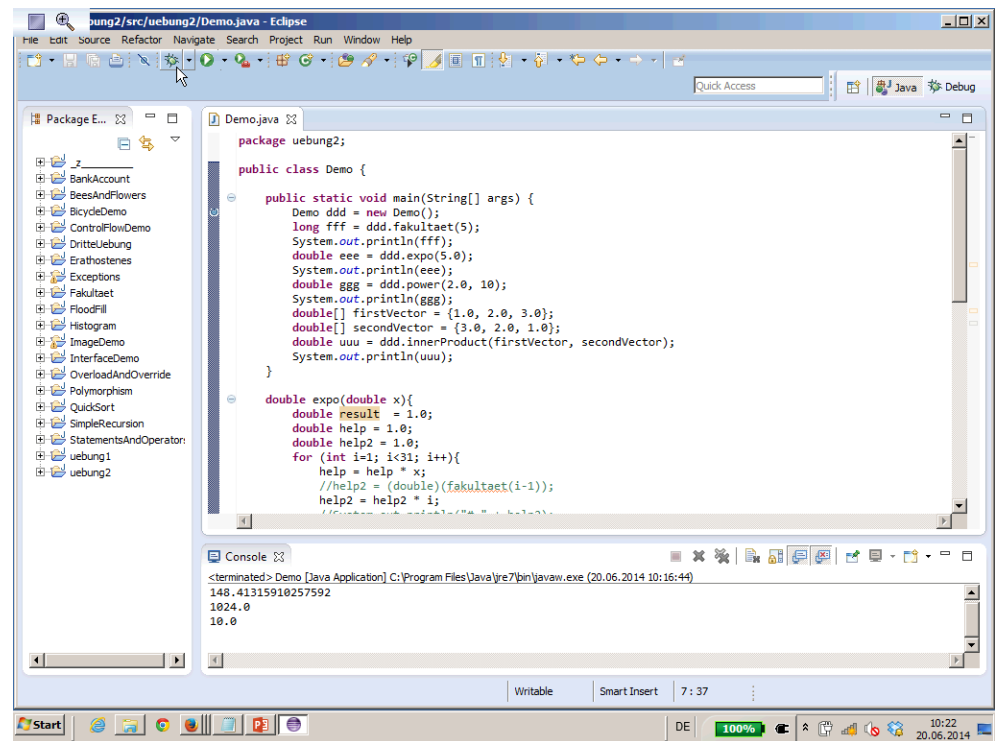
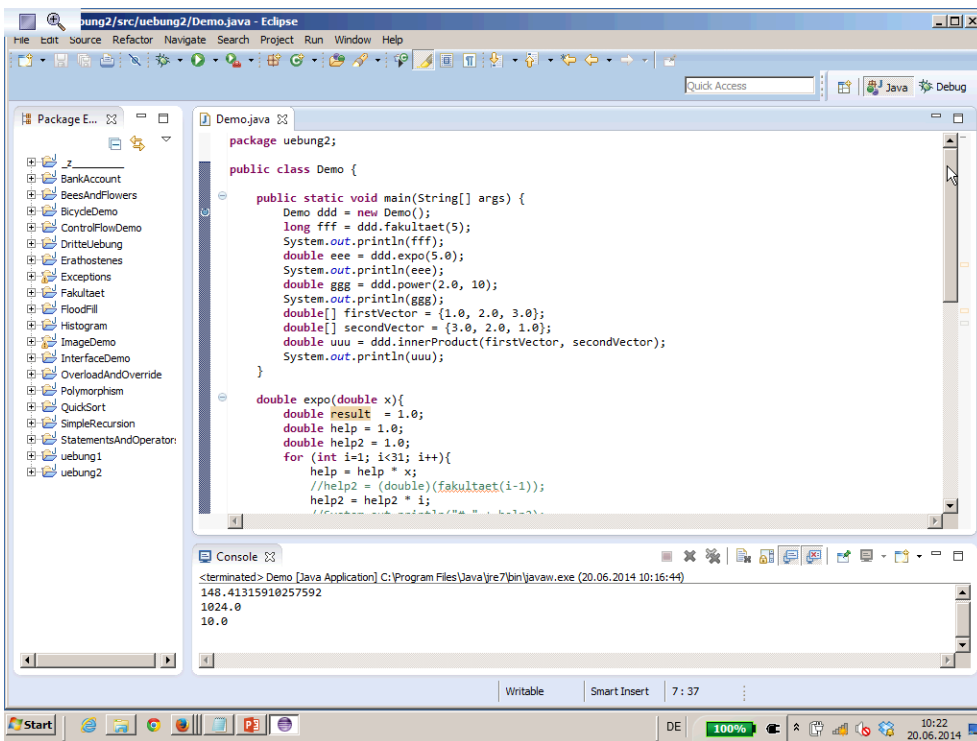












Debug Console: Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 10:24:23)
120

| Name | Value |
|------|-----------------|
| args | String[] (d=16) |
| ddd | Demo (d=19) |
| fff | 120 |
| eee | |

```

public static void main(String[] args) {
    Demo ddd = new Demo();
    long fff = ddd.fakultaet(5);
    System.out.println(fff);
    double eee = ddd.expo(5.0);
    System.out.println(eee);
    double ggg = ddd.power(2.0, 10);
    System.out.println(ggg);
    double[] firstVector = {1.0, 2.0, 3.0};
    double[] secondVector = {3.0, 2.0, 1.0};
    double uuu = ddd.innerProduct(firstVector, secondVector);
    System.out.println(uuu);
}

```

Debug Console: Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 10:24:23)
120

| Name | Value |
|--------|--------------------|
| this | Demo (d=19) |
| x | 5.0 |
| result | 138.30716765873015 |
| help | 390625.0 |
| help2 | |

```

double expo(double x){
    double result = 1.0;
    double help = 1.0;
    double help2 = 1.0;
    for (int i=1; i<31; i++){
        help = help * x;
        //help2 = (double)(fakultaet(i-1));
        help2 = help2 * i;
        //System.out.println("# " + help2);
        result = result + (help / help2);
    }
    return result;
}

```

Debug Console: Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 10:24:23)
120
148.41315910257592

| Name | Value |
|------|--------------------|
| args | String[] (d=16) |
| ddd | Demo (d=19) |
| fff | 120 |
| eee | 148.41315910257592 |
| ggg | |

```

public static void main(String[] args) {
    Demo ddd = new Demo();
    long fff = ddd.fakultaet(5);
    System.out.println(fff);
    double eee = ddd.expo(5.0);
    System.out.println(eee);
    double ggg = ddd.power(2.0, 10);
    System.out.println(ggg);
    double[] firstVector = {1.0, 2.0, 3.0};
    double[] secondVector = {3.0, 2.0, 1.0};
    double uuu = ddd.innerProduct(firstVector, secondVector);
    System.out.println(uuu);
}

```

Debug Console: Demo [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (20.06.2014 10:24:23)
120
148.41315910257592

| Name | Value |
|------|--------------------|
| args | String[] (d=16) |
| ddd | Demo (d=19) |
| fff | 120 |
| eee | 148.41315910257592 |
| ggg | |

```

public static void main(String[] args) {
    Demo ddd = new Demo();
    long fff = ddd.fakultaet(5);
    System.out.println(fff);
    double eee = ddd.expo(5.0);
    System.out.println(eee);
    double ggg = ddd.power(2.0, 10);
    System.out.println(ggg);
    double[] firstVector = {1.0, 2.0, 3.0};
    double[] secondVector = {3.0, 2.0, 1.0};
    double uuu = ddd.innerProduct(firstVector, secondVector);
    System.out.println(uuu);
}

```

3 Classes, Objects, Inheritance

Recommended reading:

- <http://docs.oracle.com/javase/tutorial/java/javaOO/classes.html>
- <http://docs.oracle.com/javase/tutorial/java/javaOO/objects.html>
- <http://docs.oracle.com/javase/tutorial/java/javaOO/more.html>
- <http://docs.oracle.com/javase/tutorial/java/land/subclasses.html>
- <http://docs.oracle.com/javase/tutorial/essential/exceptions/index.html>

3 Classes, Objects, Inheritance

Recommended reading:

- <http://docs.oracle.com/javase/tutorial/java/javaOO/classes.html>
- <http://docs.oracle.com/javase/tutorial/java/javaOO/objects.html>
- <http://docs.oracle.com/javase/tutorial/java/javaOO/more.html>
- <http://docs.oracle.com/javase/tutorial/java/land/subclasses.html>
- <http://docs.oracle.com/javase/tutorial/essential/exceptions/index.html>

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;

    public Bicycle(int startCadence, int startSpeed, int startGear) {
        gear = startGear;
        cadence = startCadence;
        speed = startSpeed;
    }

    public void changeCadence(int newValue) {
        cadence = newValue;
    }

    public void changeGear(int newValue) {
        gear = newValue;
    }

    public void speedUp(int newValue) {
        speed = speed + newValue;
    }

    public void applyBrake(int newValue) {
        speed = speed - newValue;
    }
}

public class MountainBike extends Bicycle {
    public int seatHeight;

    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }

    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;

    public Bicycle(int startCadence, int startSpeed, int startGear) {
        gear = startGear;
        cadence = startCadence;
        speed = startSpeed;
    }

    public void changeCadence(int newValue) {
        cadence = newValue;
    }

    public void changeGear(int newValue) {
        gear = newValue;
    }

    public void speedUp(int newValue) {
        speed = speed + newValue;
    }

    public void applyBrake(int newValue) {
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    }
}

public class MountainBike extends Bicycle {
    public int seatHeight;

    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }

    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;
    public Bicycle(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        gear = newVa
        cad
        spe
    }
    public void changeSeatHeight(int seatHeight) {
        gear = newVa
    }
    public void speedUp() {
        speed = spee
    }
    public void applyBrake() {
        speed = spee
    }
}
```

- **Class definition (general form):**
`modifier class MyClass extends MySuperClass implements YourInterface1, ..., YourInterfaceN`
- **(Access) modifier (for classes):**
certain combinations of {public, protected, private, static, final, abstract}

```
public class MountainBike extends Bicycle {
    public int seatHeight;
    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }
    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;
    public Bicycle(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        gear = newVa
        cad
        spe
    }
    public void changeSeatHeight(int seatHeight) {
        gear = newVa
    }
    public void speedUp() {
        speed = spee
    }
    public void applyBrake() {
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    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }
    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;
    public Bicycle(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        gear = newVa
        cad
        spe
    }
    public void changeSeatHeight(int seatHeight) {
        gear = newVa
    }
    public void speedUp() {
        speed = spee
    }
    public void applyBrake() {
        speed = spee
    }
}
```

- **Field declaration (general form):**
`modifier type name ;`
- **(Access) modifier (for fields):**
certain combinations of {public, protected, private, static, final}
- **type:** Any primitive or reference type

```
public class MountainBike extends Bicycle {
    public int seatHeight;
    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }
    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;
    public Bicycle(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        gear = newVa
        cad
        spe
    }
    public void changeSeatHeight(int seatHeight) {
        gear = newVa
    }
    public void speedUp() {
        speed = spee
    }
    public void applyBrake() {
        speed = spee
    }
}
```

- **Method declaration (general form):**
`modifier typeOfReturnValue name (parameter*) throwsClause { statement* }`
- **(Access) modifier (for methods):**
certain combinations of {public, protected, private, static, final, abstract}
- **typeOfReturnValue:** Any primitive or reference type
- **parameter*:** (later)
- **throwsClause*:** (later)
- **statement*:** statement(s) to execute

```
public class MountainBike extends Bicycle {
    public int seatHeight;
    public MountainBike(int startHeight, int startCadence,
        int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }
    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {  
    public int cadence = 0;  
    public int speed = 0;  
    public int gear = 1;  
  
    public void changeGear(int gear) {  
        gear = newGear(gear);  
    }  
  
    public void speedUp() {  
        speed = speed + 1;  
    }  
  
    public void applyBrake(int brakeLevel) {  
        speed = speed - brakeLevel;  
    }  
  
    public void setHeight(int newHeight) {  
        seatHeight = newHeight;  
    }  
}
```

- Method declaration (general form):
`modifier typeOfReturnValue name (parameter*) throwsClause { statement* }`
- (Access) *modifier* (for methods):
certain combinations of {public, protected, private, static, final, abstract }
- *typeOfReturnValue*: Any primitive or reference type
- *parameter**: (later)
- *throwsClause**: (later)
- *statement**: statement(s) to execute

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {  
    public int cadence = 0;  
    public int speed = 0;  
    public int gear = 1;  
  
    public void changeGear(int gear) {  
        gear = newGear(gear);  
    }  
  
    public void speedUp() {  
        speed = speed + 1;  
    }  
  
    public void applyBrake(int brakeLevel) {  
        speed = speed - brakeLevel;  
    }  
  
    public void setHeight(int newHeight) {  
        seatHeight = newHeight;  
    }  
}
```

- Field declaration (general form):
`modifier type name ;`
- (Access) *modifier* (for fields):
certain combinations of {public, protected, private, static, final }
- *type*: Any primitive or reference type

Source: [JTutorial]

3 Classes, Objects, Inheritance

```
class Bicycle {  
    public int cadence = 0;  
    public int speed = 0;  
    public int gear = 1;  
  
    public void changeGear(int gear) {  
        gear = newGear(gear);  
    }  
  
    public void speedUp() {  
        speed = speed + 1;  
    }  
  
    public void applyBrake(int brakeLevel) {  
        speed = speed - brakeLevel;  
    }  
  
    public void setHeight(int newHeight) {  
        seatHeight = newHeight;  
    }  
}
```

- Field declaration (general form):
`modifier type name ;`
- (Access) *modifier* (for fields):
certain combinations of {public, protected, private, static, final }
- *type*: Any primitive or reference type

Source: [JTutorial]

The screenshot shows the Eclipse IDE interface. The Package Explorer on the left shows a project named 'uebung2' with several sub-packages. The main editor displays the code for 'Demo.java', which includes a 'main' method and an 'expo' method. The Console window at the bottom shows the output of the program, including the number '120' and a long decimal value '148.41315910257592'.

