Part A

Question 1

Software engineering is an application of engineering concerned with all the features of the development of high-quality, complex software systems.

Question 2

a. If consumer's requirements are not properly met some modifications in the design of the program is needed. Furthermore, in order for a better maintenance we might need to check the design phase often.
b. If there are errors in the testing phase or new changes to the program such as updates we need to modify the code (coding phase).
c. If some requirements are not met or the program doesn't respond well to the customer's input there are changes needed in the testing phase to check how the program responds to those inputs.
d. The software might need to be modified in the maintenance phase if there are faults in the program that need to be corrected or to improve the program.

Question 3

a. Legal statement because date1.getDay() returns the day of date1 (in this case 2) as an integer and assigns it to the variable temp.
b. Legal statement because since date3 is an IncDate type which inherits all the methods of its parent class Date. Therefore date3.getYear() returns the year as an integer (in this case 2001) an assigns it to the variable temp.
c. Illegal statement because Date type variables can't use IncDate type variable (parent classes don't inherit child classes' methods).
d. Legal statement because date3 in an IncDate type and can access the method increment().
e. Legal statement because both date1 and date2 are Date type objects. In this case date2 will take the value of date1.
f. Legal statement because subclasses are assignment compatible with the superclasses above them in the inheritance hierarchy.
g. Illegal statement because it would cause an "incompatible-type" syntax error.

Question 4

not equal
equal
equal

Question 5

a. $O(N^2)$
b. $O(N^2)$
c. $O(N^5)$
d. $O(N^2)$
e. $O(N^4)$

f. $O(N^2)$;

Question 6

a. O(N)
b. $O(N^2)$
c. $O(\log_2 N)$
d. O(2)
e. O(N)

Question 7

a. Error message: Uncompilable source code – non-static method show() cannot be referenced from a static context.
b. One way to solve it the problem is to make the method static. The other solution is to show the message from the main method.

```
public class hw1A{
        public static void show(){
            System.out.println("I am Homework 1");
    }
        public static void main (String[] args){
            show();
        }

}
```

```
public class hw1A{
        public static void main (String[] args){
            System.out.println("I am Homework 1");
        }

}
```

Question 8

The words address, reference, null, pointer, link are all related to each other in a way that they all refer to a location in the memory for a non-primitive type variable. Alias on the other hand is just an object variable that refers to the same object that another object variable does.

Question 9

```
public class hw1A{
        public static void main (String[] args){
            String [] names;

            for (int i = 0; i < 10; i++){
                names = new String[10];
            }
        }

}
```