Object-Oriented Programming with Java

(a) Give three differences between an interface and an abstract class in Java. [3 marks]

(b) A novice programmer writes the following code in order to be able to completely clone an object of type Car.

```java
public class Tyre {
    private int treadRemaining;

    public void SetTread(int t) { treadRemaining = t; }
    public int GetTread() { return treadRemaining; }
}

public class Car extends Vehicle implements Cloneable {
    private Tyre tyres[] = new Tyre[4];

    public Car() {
        for (int i = 0; i < 4; i++) tyres[i] = new Tyre();
    }
    public Object clone() throws CloneNotSupportedException {
        Car c = new Car();
        c.tyres = this.tyres;
        return c;
    }
}
```

(i) Explain what it means for the treadRemaining field to be private. Explain why it is good programming practice for such fields to be private. [3 marks]

(ii) Identify the type of interface that Cloneable is. What is the defining characteristic of such interfaces? [2 marks]

(iii) Identify and explain two reasons why this code may not function as intended. [4 marks]

(iv) Rewrite the code to address the problems you have identified and allow Car objects to be fully cloned. [8 marks]