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Question 3

Firstly, we need to traverse all arrival and departure times to find how many trains arrived before midnight and depart after midnight. This number is initial value of the counter. Secondly , we need to store all the arrival and departure times in a new list, then sort the list in ascending order. Set a variable max equal to the initial counter value, traverse the entire list, if this point is an arrival time counter++, then if counter is greater than max, then assign the current counter value to max. else counter--.Finally, the value of max that is the minimum number of platforms.

Sample code(Java)

```java
class Period {
    int arrive;
    int depart;
    Period(int arrive,int depart) {
        this.arrive = arrive;
        this.depart = depart;
    }
}

class Time implements Comparable<Time> {
    // the value of time
    int value;
    // the type of time are arrive and depart
    String type;
    Time(int value,String type){
        this.value = value;
        this.type = type;
    }

    @Override
    public int compareTo(Time time){
        if(this.value == time.value) {
            return 0;
        }
        else if (this.value > time.value){
            return 1;
        }
        else {
          return -1;
        }
    }
}
```

```java
int countMax(Period[] p){
    // the value of counter should be
    // how many trains arrive before midnight and depart after midnight
    int counter;
    int max = counter;
    Time [] times = new Time[p.length*2];
    for (int i=0;i<p.length;i++){
        times[2*i] = new Time(p[i].arrive,"arrive");
        times[2*i+1] = new Time(p[i].depart,"depart");
    }
    Collections.sort(times);
    for(Time t: times){
        if(t.type.equals("arrive")) {
            counter++;
            max = Math.max(max,counter);
        }
        else {
          counter--;
        }
    }
    return max;
}
```