CSE 41321 Homework #3
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2-4-2020

a)

```
/**
* Compares 2 cars by make in ascending order, and if make equal, compares two cars by
model in ascending order
*/
class CompareCarsByMakeThenModel implements Comparator<Car> {
  public int compare(Car car1, Car car2) {
    // If car1's make is greater than car2's make
    if(car1.make.compareToIgnoreCase(car2.make) > 0) {
      return 1;
    }
    // If car2's make is greater than car1's make
    if(car1.make.compareToIgnoreCase(car2.make) < 0) {
      return -1;
    }
    // If car1's make and car2's make are equal
    if(car1.make.compareToIgnoreCase(car2.make) == 0) {
      // If car1's model is greater than car2's model
      if(car1.model.compareToIgnoreCase(car2.model) > 0) {
        return 1;
      }
      // If car2's model is greater than car1's model
      else if(car1.model.compareToIgnoreCase(car2.model) < 0) {
        return -1;
      }
    }
    // Both car1's make and model is the same as car2's make and model
    return 0;
  }
}
```

b)

```
/**
* Compares 2 cars in descending order by MPG
*/
class CompareCarsByDescendingMPG implements Comparator<Car> {
  public int compare(Car car1, Car car2) {
```

```
      // If car1's mpg is greater than car2's mpg
      if(car1.mpg > car2.mpg) {
         return -1;
      }
      // If car2's mpg is greater than car1's mpg
      if(car1.mpg < car2.mpg) {
         return 1;
      }
      // If car1's mpg is the same as car2's mpg
      return 0;
   }
}
```

c)

```
/**
* Compares 2 cars by make in ascending order, and if equal, compares two cars by MPG in
descending order.
*/
class CompareCarsByMakeThenDescendingMPG implements Comparator<Car> {
   public int compare(Car car1, Car car2) {
      // If car1's make is greater than car2's make
      if(car1.make.compareToIgnoreCase(car2.make) > 0) {
         return 1;
      }
      // If car2's make is greater than car1's make
      if(car1.make.compareToIgnoreCase(car2.make) < 0) {
         return -1;
      }
      // If car1's make is equal to car2's make
      if(car1.make.compareToIgnoreCase(car2.make) == 0) {
         // If car1's mpg is greater than car2's mpg
         if(car1.mpg > car2.mpg) {
            return -1;
         }
         // If car2's mpg is greater than car1's mpg
         if(car1.mpg < car2.mpg) {
            return 1;
         }
      }
      // If car1's make and mpg is equal to car2's make and mpg
      return 0;
```

```
  }
}
```

d)

```
  public static void main(String[] args) {
    // These are the comparators which are used when sorting
    CompareCarsByMakeThenModel compareCarsByMakeThenModel = new
CompareCarsByMakeThenModel();
    CompareCarsByDescendingMPG compareCarsByDescendingMPG = new
CompareCarsByDescendingMPG();
    CompareCarsByMakeThenDescendingMPG
compareCarsByMakeThenDescendingMPG = new
CompareCarsByMakeThenDescendingMPG();

    // Array of cars used for testing purposes to verify comparators and sorting
    Car cars[] = {
        new Car("Toyota", "Camry", 33),
        new Car("Ford", "Focus", 40),
        new Car("Honda", "Accord", 34),
        new Car("Ford", "Mustang", 31),
        new Car("Honda", "Civic", 39),
        new Car("Toyota", "Prius", 48),
        new Car("Honda", "Fit", 35),
        new Car("Toyota", "Corolla", 35),
        new Car("Ford", "Taurus", 28)
    };

    /**
     * This block of code is used to show that the comparators do their job and quick sort
sorts properly!!!
     */
    System.out.print("'CARS' ARRAY UNSORTED:\n\n");
    printCarArr(cars);
    System.out.print("\n\n'CARS' ARRAY SORTED BY MAKE THEN MODEL:\n\n");
    QuickSort.quickSort(cars, compareCarsByMakeThenModel);
    printCarArr(cars);
    System.out.print("\n\n'CARS' ARRAY SORTED BY DESCENDING MPG:\n\n");
    QuickSort.quickSort(cars, compareCarsByDescendingMPG);
    printCarArr(cars);
    System.out.print("\n\n'CARS' ARRAY SORTED BY MAKE THEN DESCENDING
MPG:\n\n");
```

```
        QuickSort.quickSort(cars, compareCarsByMakeThenDescendingMPG);
        printCarArr(cars);
    }
}
```

OUTPUT:

(I inserted spaces in tabs in the text output below for formatting purposes)

'CARS' ARRAY UNSORTED:

Toyota	Camry	33
Ford	Focus	40
Honda	Accord	34
Ford	Mustang	31
Honda	Civic	39
Toyota	Prius	48
Honda	Fit	35
Toyota	Corolla	35
Ford	Taurus	28

'CARS' ARRAY SORTED BY MAKE THEN MODEL:

Ford	Focus	40
Ford	Mustang	31
Ford	Taurus	28
Honda	Accord	34
Honda	Civic	39
Honda	Fit	35
Toyota	Camry	33
Toyota	Corolla	35
Toyota	Prius	48

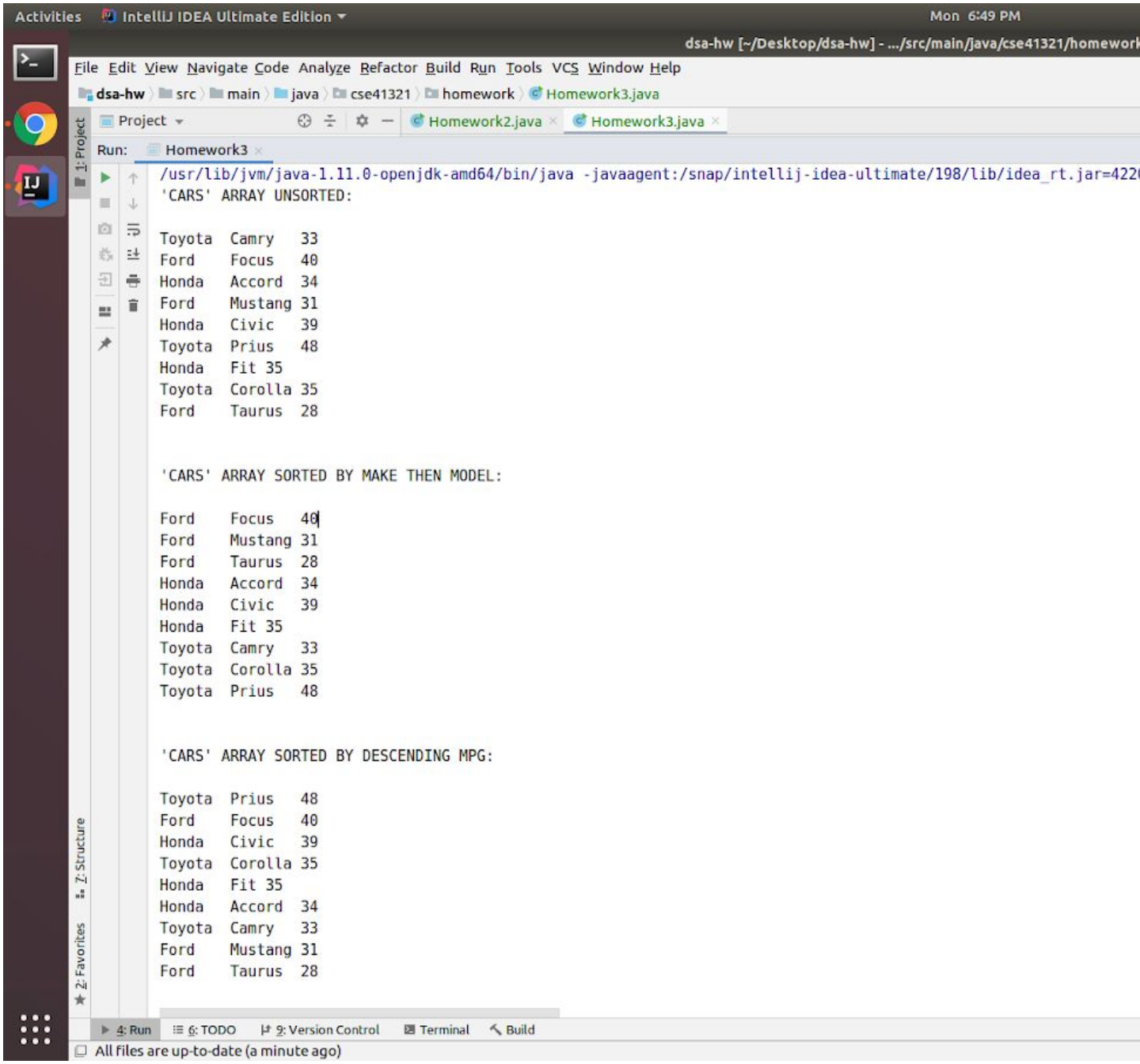
'CARS' ARRAY SORTED BY DESCENDING MPG:

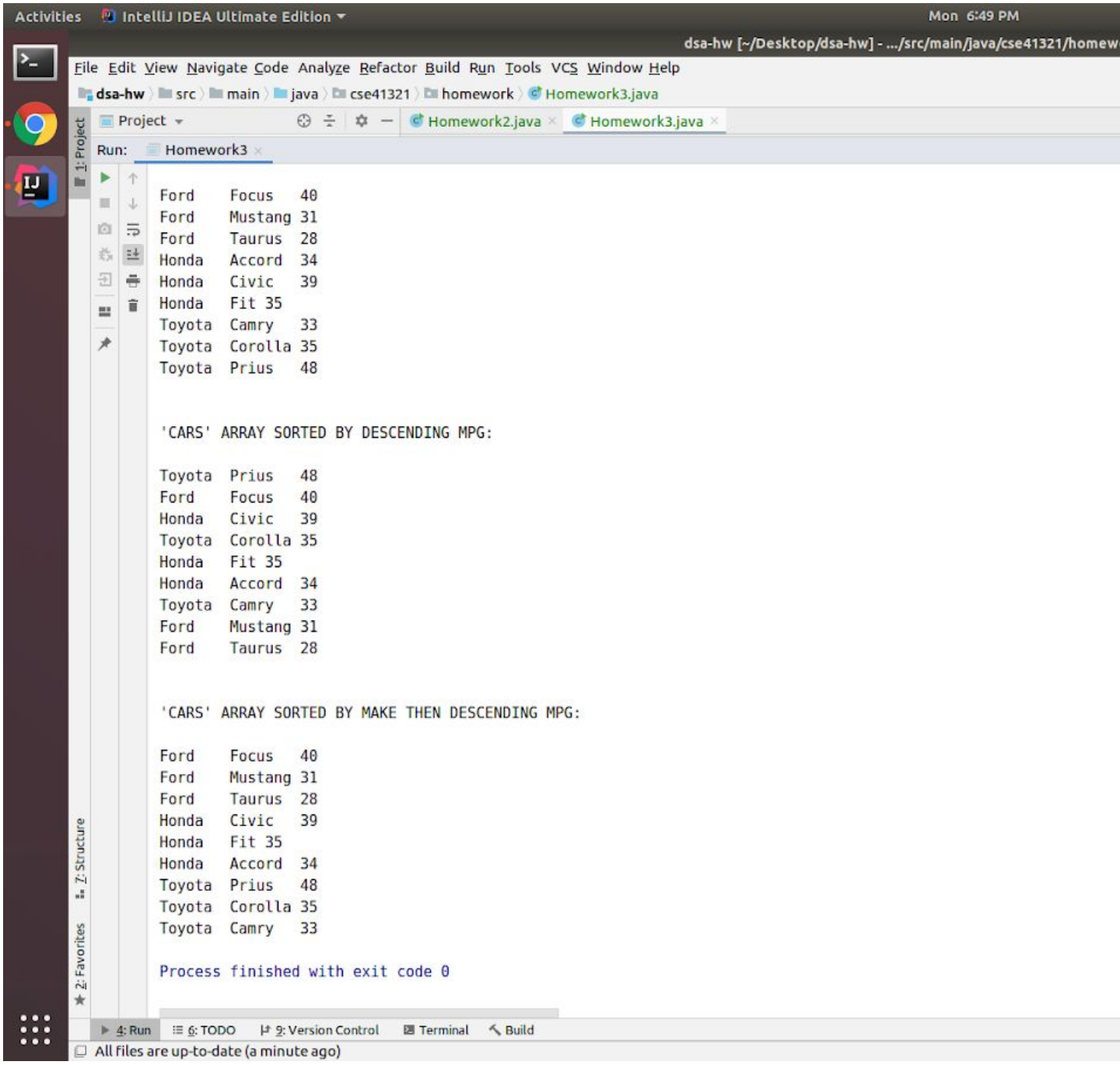
Toyota	Prius	48
Ford	Focus	40
Honda	Civic	39
Toyota	Corolla	35
Honda	Fit	35
Honda	Accord	34
Toyota	Camry	33
Ford	Mustang	31
Ford	Taurus	28

'CARS' ARRAY SORTED BY MAKE THEN DESCENDING MPG:

Ford	Focus	40
Ford	Mustang	31
Ford	Taurus	28
Honda	Civic	39
Honda	Fit	35
Honda	Accord	34
Toyota	Prius	48
Toyota	Corolla	35
Toyota	Camry	33

Process finished with exit code 0


Activities
IntelliJ IDEA Ultimate Edition
Mon 6:49 PM
dsa-hw [~/Desktop/dsa-hw] - .../src/main/java/cse41321/homework
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
dsa-hw src main java cse41321 homework Homework3.java
Project
Homework2.java
Homework3.java
Run:
Homework3
/usr/lib/jvm/java-1.11.0-openjdk-amd64/bin/java -javaagent:/snap/intellij-idea-ultimate/198/lib/idea_rt.jar=422
'CARS' ARRAY UNSORTED:
Toyota Camry 33
Ford Focus 40
Honda Accord 34
Ford Mustang 31
Honda Civic 39
Toyota Prius 48
Honda Fit 35
Toyota Corolla 35
Ford Taurus 28
'CARS' ARRAY SORTED BY MAKE THEN MODEL:
Ford Focus 40
Ford Mustang 31
Ford Taurus 28
Honda Accord 34
Honda Civic 39
Honda Fit 35
Toyota Camry 33
Toyota Corolla 35
Toyota Prius 48
'CARS' ARRAY SORTED BY DESCENDING MPG:
Toyota Prius 48
Ford Focus 40
Honda Civic 39
Toyota Corolla 35
Honda Fit 35
Honda Accord 34
Toyota Camry 33
Ford Mustang 31
Ford Taurus 28
1: Project
7: Structure
2: Favorites
4: Run
6: TODO
9: Version Control
Terminal
Build
All files are up-to-date (a minute ago)


Activities
IntelliJ IDEA Ultimate Edition
Mon 6:49 PM
dsa-hw [~/Desktop/dsa-hw] - .../src/main/java/cse41321/homew
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
dsa-hw src main java cse41321 homework Homework3.java
Project
Homework2.java
Homework3.java
Run:
Homework3
Ford Focus 40
Ford Mustang 31
Ford Taurus 28
Honda Accord 34
Honda Civic 39
Honda Fit 35
Toyota Camry 33
Toyota Corolla 35
Toyota Prius 48
'CARS' ARRAY SORTED BY DESCENDING MPG:
Toyota Prius 48
Ford Focus 40
Honda Civic 39
Toyota Corolla 35
Honda Fit 35
Honda Accord 34
Toyota Camry 33
Ford Mustang 31
Ford Taurus 28
'CARS' ARRAY SORTED BY MAKE THEN DESCENDING MPG:
Ford Focus 40
Ford Mustang 31
Ford Taurus 28
Honda Civic 39
Honda Fit 35
Honda Accord 34
Toyota Prius 48
Toyota Corolla 35
Toyota Camry 33
Process finished with exit code 0
1: Project
7: Structure
2: Favorites
4: Run
6: TODO
9: Version Control
Terminal
Build
All files are up-to-date (a minute ago)