DATA 202/472 – MODULE 2 EXCERCISES

Part I. A company has a database that records its sales. The database is comprised of two tables. Table `staff` lists staff and their locations. Table `sales` records sales made. The tables contain the following data.

Table `staff`:

staff_id	name	location
101	James	Auckland
102	William	Wellington
103	Thomas	Christchurch
104	Olivia	Wellington
105	Jack	Auckland

Table `sales`:

invoice	staff_id	description	price
9753	101	Honda Fit Hybrid	14900
9754	102	Suzuki Swift 12XG	13500
9755	103	Suzuki Swift HYBRID RS	19999
9756	101	Mazda Demio 13-Skyactive	11000
9757	104	Nissan March S	9900
9758	105	Toyota Vitz 5D F	8950
9759	102	Toyota Prius S	24000
9760	101	Suzuki Swift 12XG	20000

a. Write down the output of the following SQL query:

```
SELECT name, description, price
FROM staff
INNER JOIN sales ON sales.staff_id=staff.staff_id
WHERE location = 'Wellington'
```

(3 Marks)

ANS:

name	description	price
William	Suzuki Swift 12XG	13500
William	Toyota Prius S	24000
Olivia	Nissan March S	9900

b. Write down the output of the following SQL query:

```sql
SELECT staff.staff_id, name, count(*) AS total_sales
FROM staff
INNER JOIN sales ON sales.staff_id=staff.staff_id
GROUP BY staff.staff_id
ORDER BY total_sales
```

(3 Marks)

ANS:

staff_id	name	total_sales
103	Thomas	1
104	Olivia	1
105	Jack	1
102	William	2
101	James	3

c. Write a SQL query that returns the following table:

location	sum_sales
Auckland	54850
Christchurch	19999
Wellington	47400

(3 Marks)

ANS:

```sql
SELECT location, sum(price) AS sum_sales
FROM staff
INNER JOIN sales ON sales.staff_id=staff.staff_id
GROUP BY location
```

d. Write a SQL query that returns **only** the description of the item with the highest price:

(3 Marks)

ANS:

```sql
SELECT description
FROM sales
WHERE price = (SELECT MAX(price) FROM sales)
```

Part II. For the following questions, assume that variable `rents` contains a data frame about weekly market rent for properties in some areas of Wellington. The whole content of the data frame is shown in the table below.

Table `rents`:

area	bedrooms	lower_quartile	median_rent	upper_quartile
Aro Valley	1	378	400	458
Aro Valley	2	405	500	563
Aro Valley	3	660	695	790
Karori	1	375	415	440
Karori	2	495	560	580
Northland	1	388	420	448
Northland	2	500	510	545
Northland	3	645	675	764
Island Bay	1	388	400	448
Island Bay	2	515	560	600
Seatoun	1	430	493	535

a. Write R code that adds a column named `IQR` to the `rents` data frame which records the difference in `upper_quartile` and `lower_quartile` (hint: using `dplyr`):

(3 Marks)

ANS:

```
rents <- mutate(rents, IQR=upper_quartile-lower_quartile)
```

b. Write R code to display the row(s) in which IQR is maximum:

(3 Marks)

ANS:

```
filter(rents, IQR==max(IQR))
```

```
##         area bedrooms lower_quartile median_rent upper_quartile IQR
## 1 Aro Valley        2            405         500            563 158
```

c. Write R code using the pipe operator %>% to change the name of column `bedrooms` to `size`, and then display the market rent information in Karori and Northland.

(3 Marks)

ANS:

```
rents %>% rename(size=bedrooms) %>%
          filter(area %in% c("Karori", "Northland"))
```

```
##        area size lower_quartile median_rent upper_quartile IQR
## 1    Karori    1            375         415            440  65
```

```
## 2    Karori    2            495          560            580  85
## 3 Northland    1            388          420            448  60
## 4 Northland    2            500          510            545  45
## 5 Northland    3            645          675            764 119
```

d. Write down the output of the following code:

```
rents[rents$median_rent > 600, 1]
```

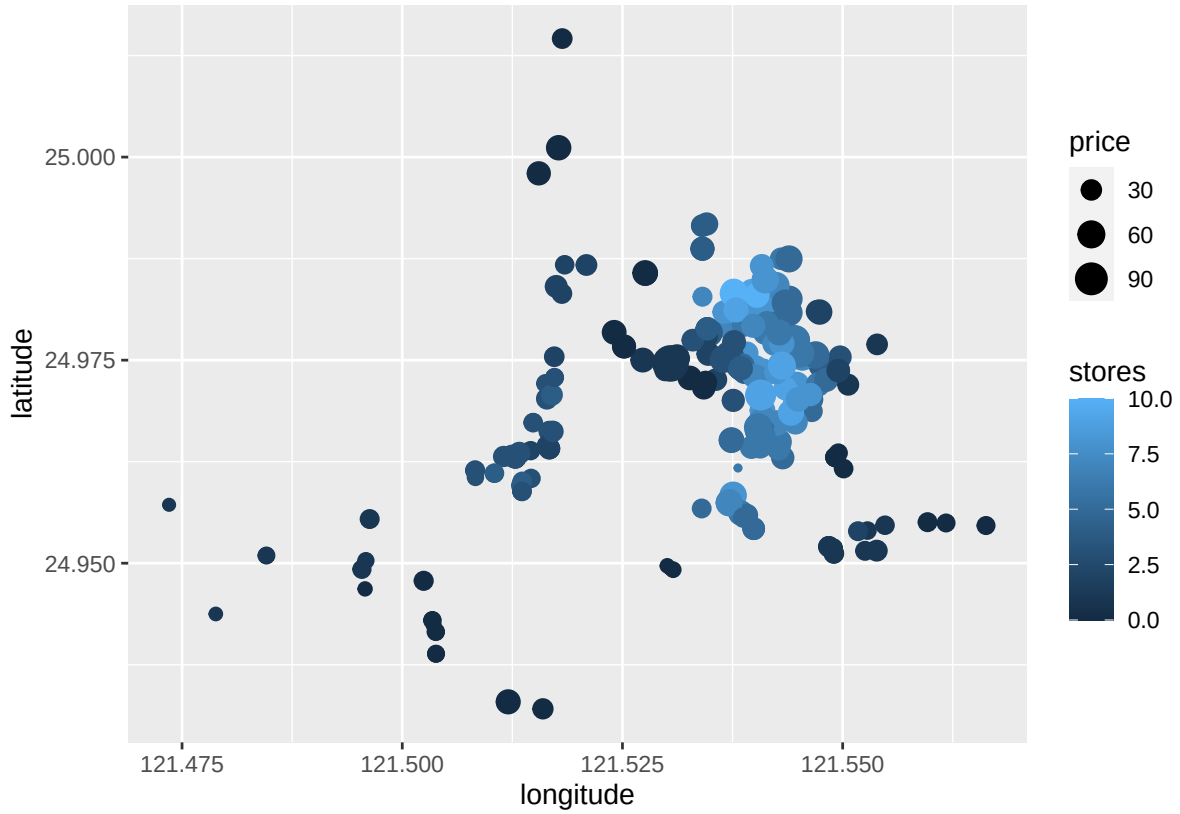
(3 Marks)

ANS:

```
## [1] "Aro Valley" "Northland"
```

Part III. You are given a dataset called `housing`, part of which is shown here:

```
##   houseage    distMRT stores latitude longitude price
## 1      0.0  292.99780      6 24.97744  121.5446  69.7
## 2     19.1  461.10160      5 24.95425  121.5399  34.0
## 3      6.4   90.45606      9 24.97433  121.5431  62.2
## 4      4.5 2275.87700      3 24.96314  121.5115  29.3
## 5     35.3  614.13940      7 24.97913  121.5367  33.1
```

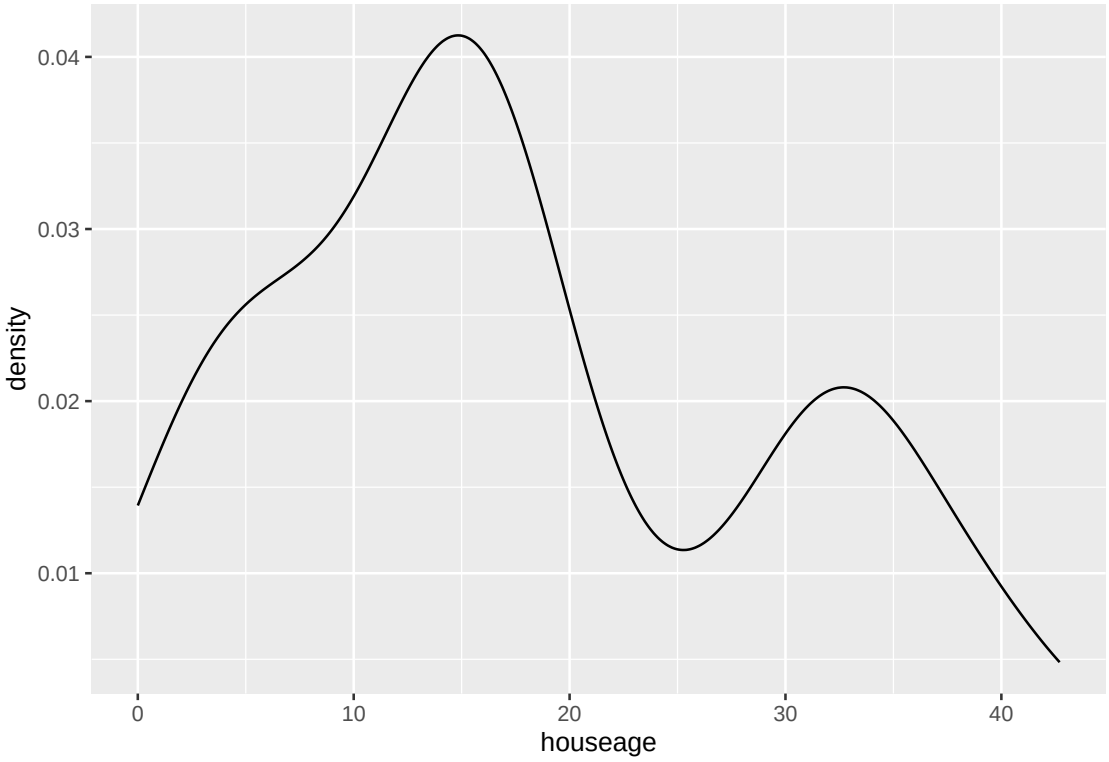


a. Examine the plot above and write R code to produce that plot:

(4 Marks)

ANS:

```
ggplot(housing) +
  geom_point(aes(x = longitude, y = latitude, color=stores, size = price),
             position = "jitter")
```

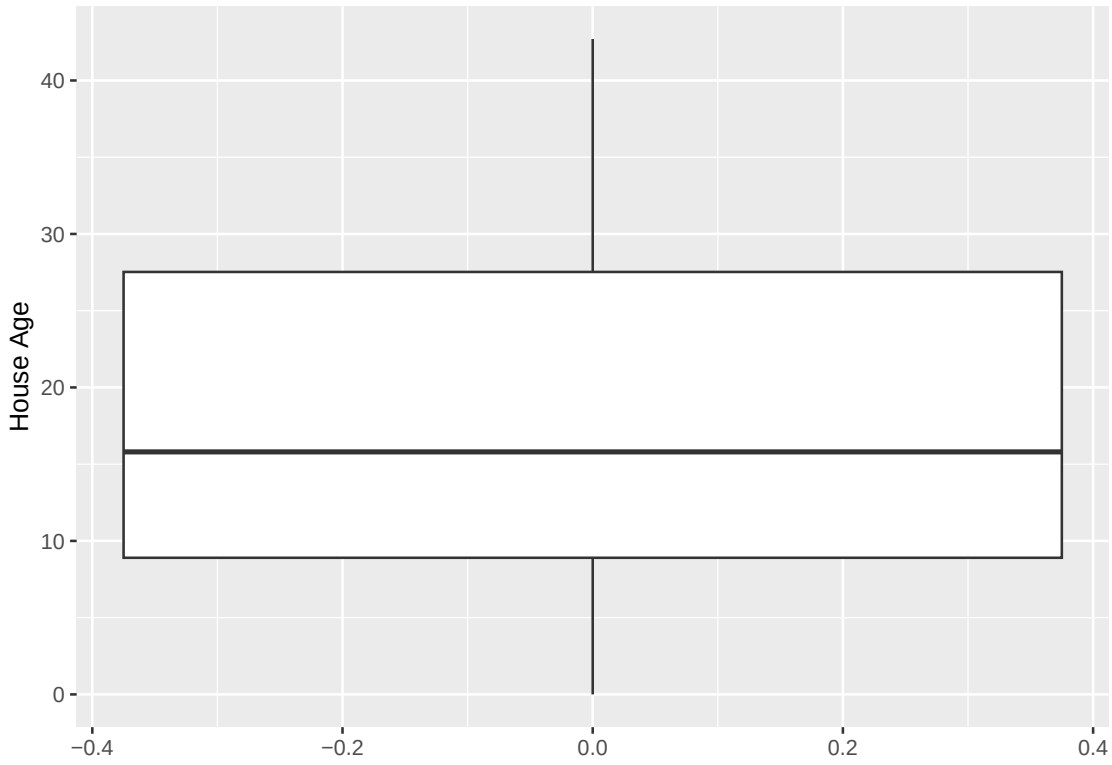


b. Examine the plot above and write R code to produce that plot:

(3 Marks)

ANS:

```
ggplot(housing) +
  geom_freqpoly(aes(x = houseage), stat = "density")
```



c. Examine the plot above and write R code to produce that plot:

(3 Marks)

ANS:

```
ggplot(housing) +
  geom_boxplot(aes(x = houseage)) +
  labs(x="House Age") +
  coord_flip()
```