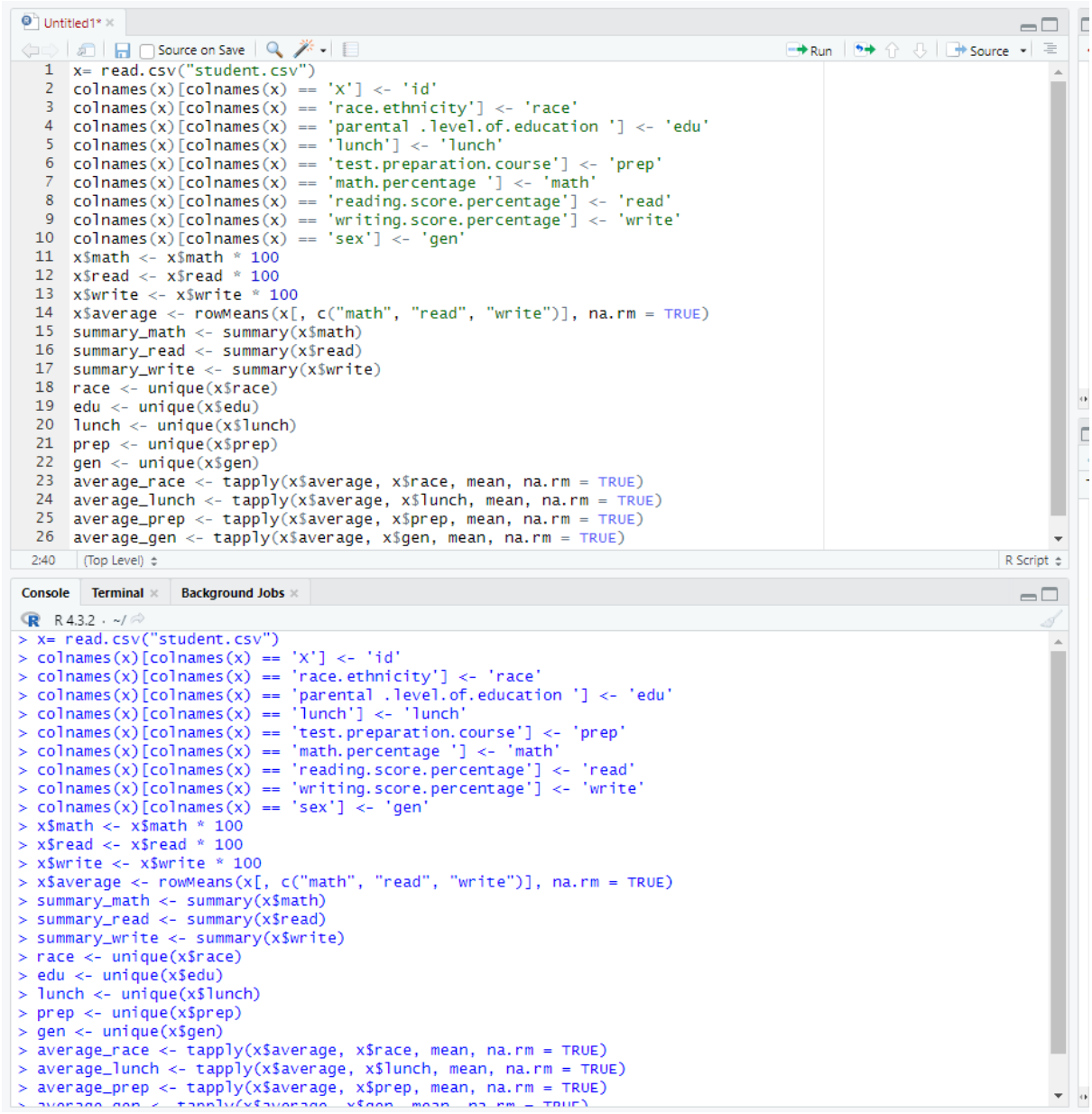
SCS2211 - LABORATORY II

Practical – 02

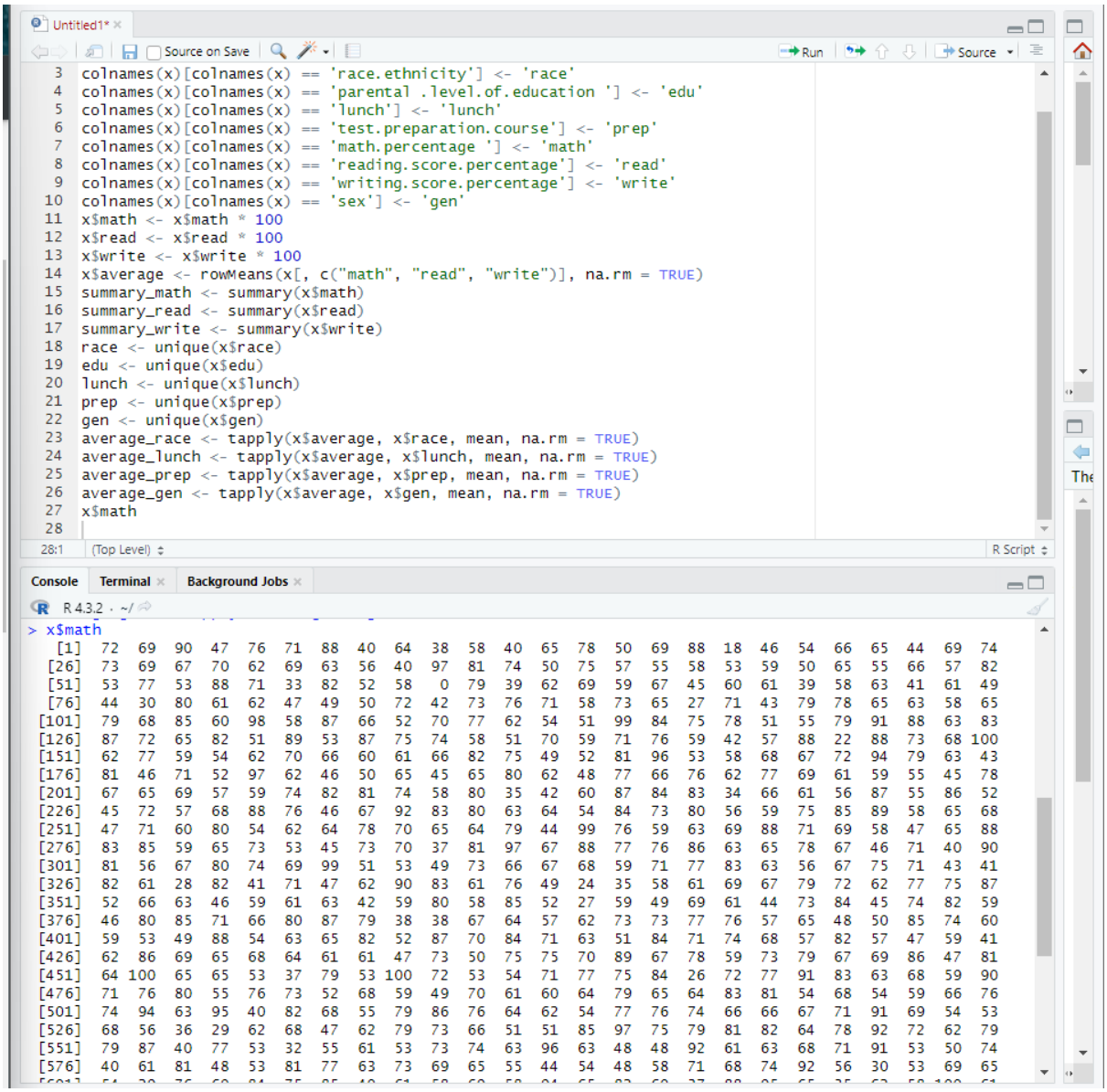
Activity 1



```
x= read.csv("student.csv")
colnames(x)[colnames(x) == 'X'] <- 'id'
colnames(x)[colnames(x) == 'race.ethnicity'] <- 'race'
colnames(x)[colnames(x) == 'parental .level.of.education '] <- 'edu'
colnames(x)[colnames(x) == 'lunch'] <- 'lunch'
colnames(x)[colnames(x) == 'test.preparation.course'] <- 'prep'
colnames(x)[colnames(x) == 'math.percentage '] <- 'math'
colnames(x)[colnames(x) == 'reading.score.percentage'] <- 'read'
colnames(x)[colnames(x) == 'writing.score.percentage'] <- 'write'
colnames(x)[colnames(x) == 'sex'] <- 'gen'
x$math <- x$math * 100
x$read <- x$read * 100
x$write <- x$write * 100
x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
```

```
> x= read.csv("student.csv")
> colnames(x)[colnames(x) == 'X'] <- 'id'
> colnames(x)[colnames(x) == 'race.ethnicity'] <- 'race'
> colnames(x)[colnames(x) == 'parental .level.of.education '] <- 'edu'
> colnames(x)[colnames(x) == 'lunch'] <- 'lunch'
> colnames(x)[colnames(x) == 'test.preparation.course'] <- 'prep'
> colnames(x)[colnames(x) == 'math.percentage '] <- 'math'
> colnames(x)[colnames(x) == 'reading.score.percentage'] <- 'read'
> colnames(x)[colnames(x) == 'writing.score.percentage'] <- 'write'
> colnames(x)[colnames(x) == 'sex'] <- 'gen'
> x$math <- x$math * 100
> x$read <- x$read * 100
> x$write <- x$write * 100
> x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
> summary_math <- summary(x$math)
> summary_read <- summary(x$read)
> summary_write <- summary(x$write)
> race <- unique(x$race)
> edu <- unique(x$edu)
> lunch <- unique(x$lunch)
> prep <- unique(x$prep)
> gen <- unique(x$gen)
> average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
> average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
> average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
```

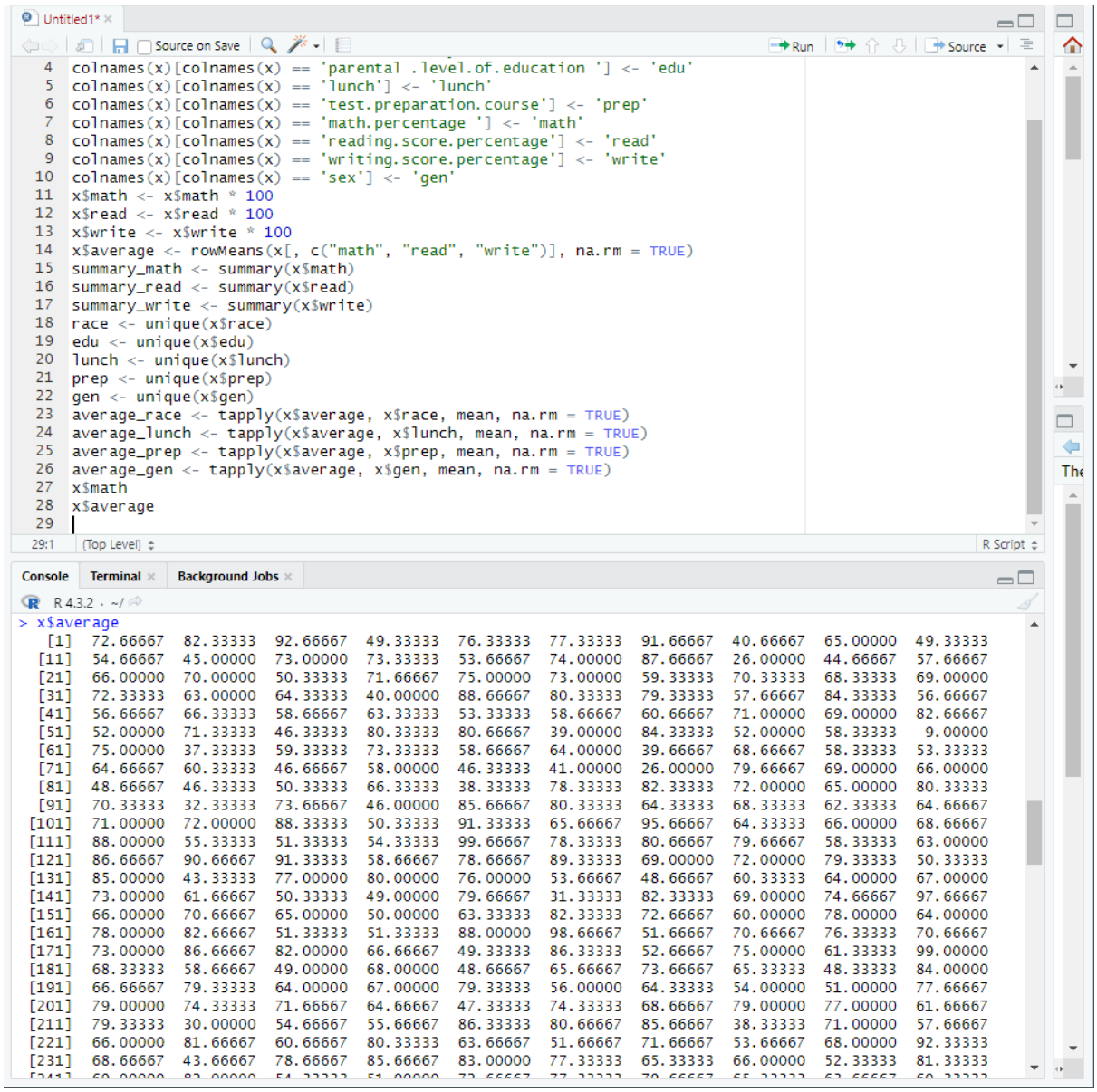
4.



```
colnames(x)[colnames(x) == 'race.ethnicity'] <- 'race'
colnames(x)[colnames(x) == 'parental .level.of.education '] <- 'edu'
colnames(x)[colnames(x) == 'lunch'] <- 'lunch'
colnames(x)[colnames(x) == 'test.preparation.course'] <- 'prep'
colnames(x)[colnames(x) == 'math.percentage '] <- 'math'
colnames(x)[colnames(x) == 'reading.score.percentage'] <- 'read'
colnames(x)[colnames(x) == 'writing.score.percentage'] <- 'write'
colnames(x)[colnames(x) == 'sex'] <- 'gen'
x$math <- x$math * 100
x$read <- x$read * 100
x$write <- x$write * 100
x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
x$math
```

```
> x$math
  [1]  72  69  90  47  76  71  88  40  64  38  58  40  65  78  50  69  88  18  46  54  66  65  44  69  74
 [26]  73  69  67  70  62  69  63  56  40  97  81  74  50  75  57  55  58  53  59  50  65  55  66  57  82
 [51]  53  77  53  88  71  33  82  52  58   0  79  39  62  69  59  67  45  60  61  39  58  63  41  61  49
 [76]  44  30  80  61  62  47  49  50  72  42  73  76  71  58  73  65  27  71  43  79  78  65  63  58  65
[101]  79  68  85  60  98  58  87  66  52  70  77  62  54  51  99  84  75  78  51  55  79  91  88  63  83
[126]  87  72  65  82  51  89  53  87  75  74  58  51  70  59  71  76  59  42  57  88  22  88  73  68 100
[151]  62  77  59  54  62  70  66  60  61  66  82  75  49  52  81  96  53  58  68  67  72  94  79  63  43
[176]  81  46  71  52  97  62  46  50  65  45  65  80  62  48  77  66  76  62  77  69  61  59  55  45  78
[201]  67  65  69  57  59  74  82  81  74  58  80  35  42  60  87  84  83  34  66  61  56  87  55  86  52
[226]  45  72  57  68  88  76  46  67  92  83  80  63  64  54  84  73  80  56  59  75  85  89  58  65  68
[251]  47  71  60  80  54  62  64  78  70  65  64  79  44  99  76  59  63  69  88  71  69  58  47  65  88
[276]  83  85  59  65  73  53  45  73  70  37  81  97  67  88  77  76  86  63  65  78  67  46  71  40  90
[301]  81  56  67  80  74  69  99  51  53  49  73  66  67  68  59  71  77  83  63  56  67  75  71  43  41
[326]  82  61  28  82  41  71  47  62  90  83  61  76  49  24  35  58  61  69  67  79  72  62  77  75  87
[351]  52  66  63  46  59  61  63  42  59  80  58  85  52  27  59  49  69  61  44  73  84  45  74  82  59
[376]  46  80  85  71  66  80  87  79  38  38  67  64  57  62  73  73  77  76  57  65  48  50  85  74  60
[401]  59  53  49  88  54  63  65  82  52  87  70  84  71  63  51  84  71  74  68  57  82  57  47  59  41
[426]  62  86  69  65  68  64  61  61  47  73  50  75  75  70  89  67  78  59  73  79  67  69  86  47  81
[451]  64 100  65  65  53  37  79  53 100  72  53  54  71  77  75  84  26  72  77  91  83  63  68  59  90
[476]  71  76  80  55  76  73  52  68  59  49  70  61  60  64  79  65  64  83  81  54  68  54  59  66  76
[501]  74  94  63  95  40  82  68  55  79  86  76  64  62  54  77  76  74  66  66  67  71  91  69  54  53
[526]  68  56  36  29  62  68  47  62  79  73  66  51  51  85  97  75  79  81  82  64  78  92  72  62  79
[551]  79  87  40  77  53  32  55  61  53  73  74  63  96  63  48  48  92  61  63  68  71  91  53  50  74
[576]  40  61  81  48  53  81  77  63  73  69  65  55  44  54  48  58  71  68  74  92  56  30  53  69  65
```

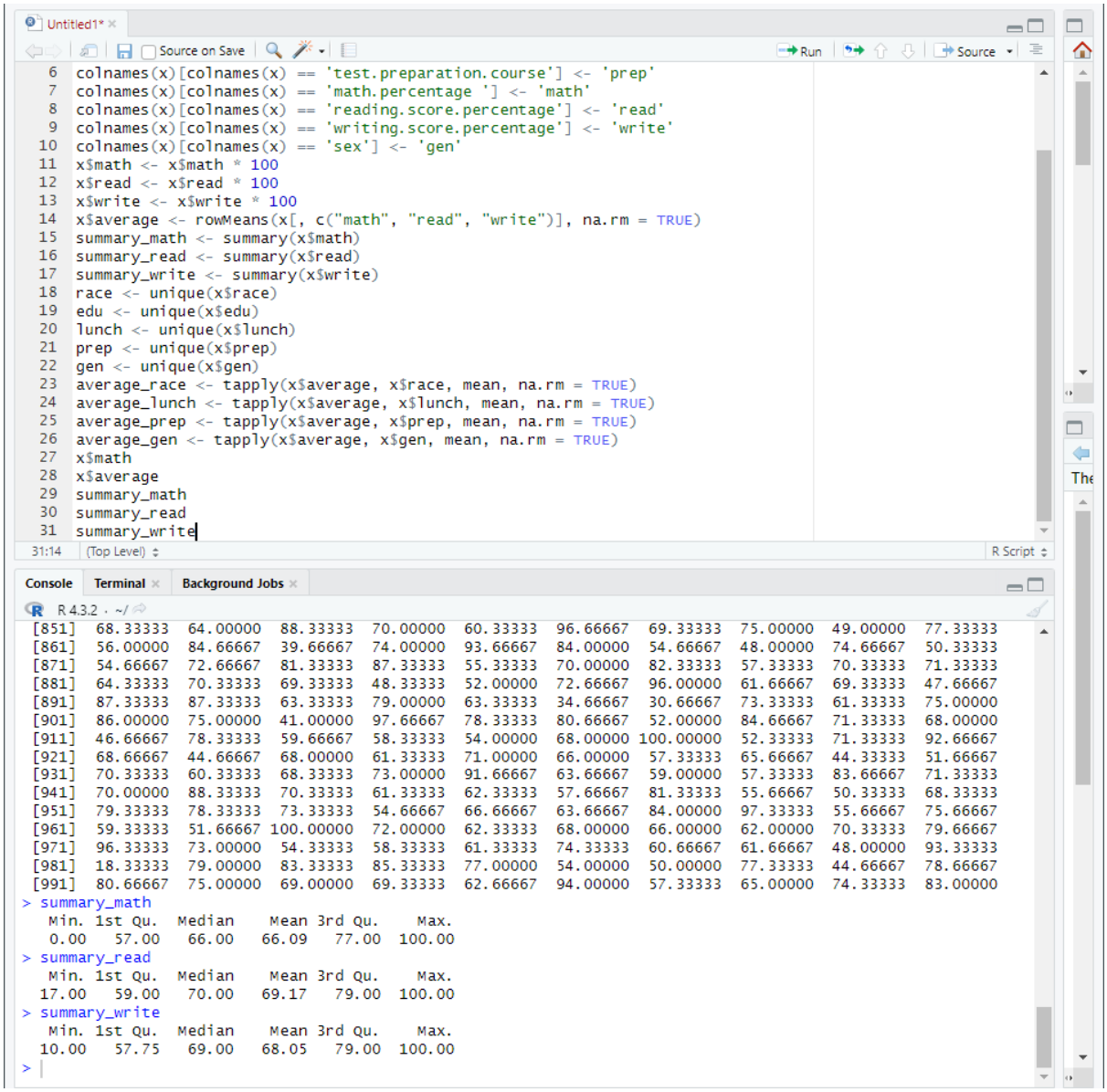
5.



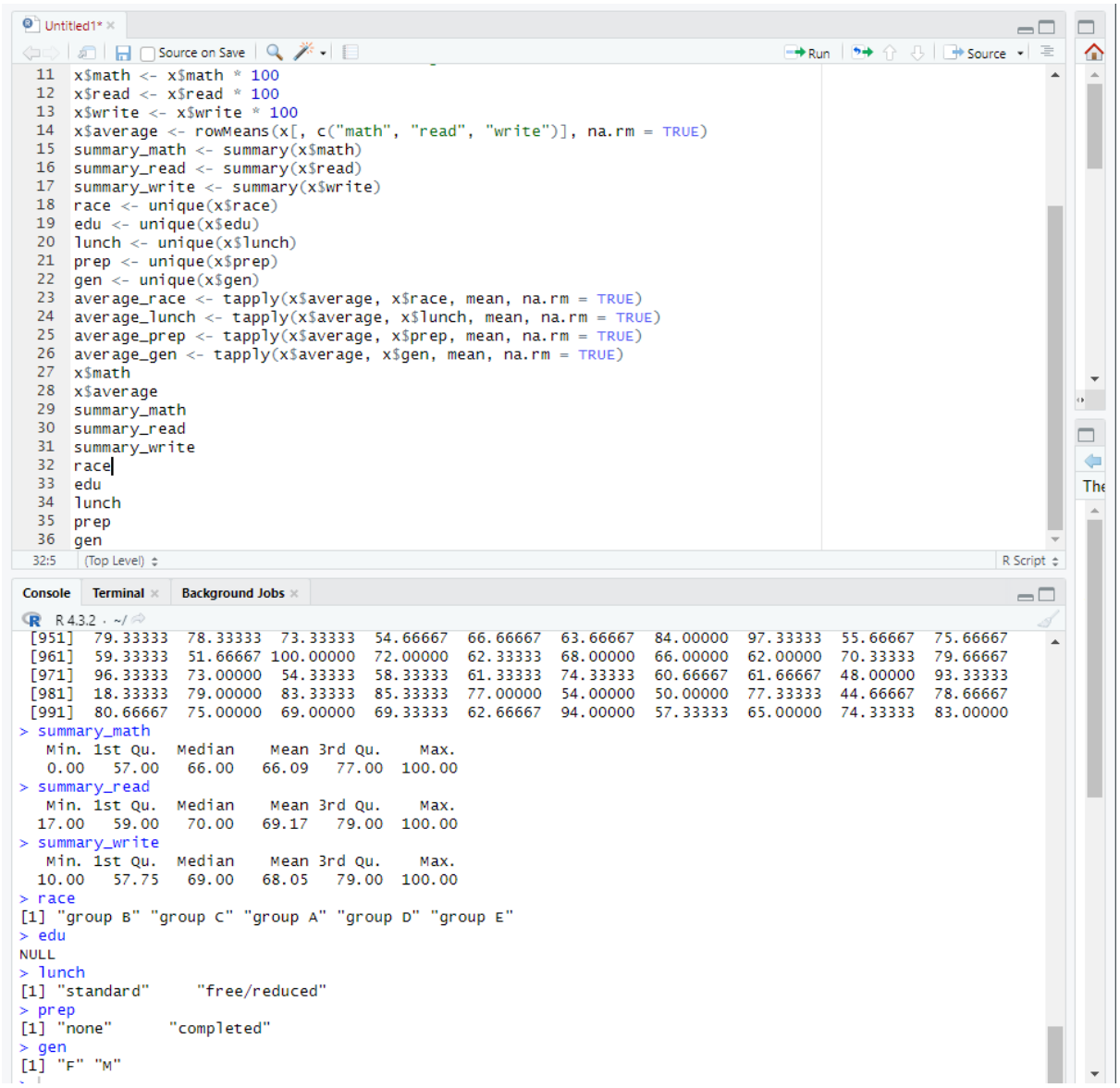
```
colnames(x)[colnames(x) == 'parental .level.of.education '] <- 'edu'
colnames(x)[colnames(x) == 'lunch'] <- 'lunch'
colnames(x)[colnames(x) == 'test.preparation.course'] <- 'prep'
colnames(x)[colnames(x) == 'math.percentage '] <- 'math'
colnames(x)[colnames(x) == 'reading.score.percentage'] <- 'read'
colnames(x)[colnames(x) == 'writing.score.percentage'] <- 'write'
colnames(x)[colnames(x) == 'sex'] <- 'gen'
x$math <- x$math * 100
x$read <- x$read * 100
x$write <- x$write * 100
x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
x$math
x$average
```

```
> x$average
  [1]  72.66667  82.33333  92.66667  49.33333  76.33333  77.33333  91.66667  40.66667  65.00000  49.33333
 [11]  54.66667  45.00000  73.00000  73.33333  53.66667  74.00000  87.66667  26.00000  44.66667  57.66667
 [21]  66.00000  70.00000  50.33333  71.66667  75.00000  73.00000  59.33333  70.33333  68.33333  69.00000
 [31]  72.33333  63.00000  64.33333  40.00000  88.66667  80.33333  79.33333  57.66667  84.33333  56.66667
 [41]  56.66667  66.33333  58.66667  63.33333  53.33333  58.66667  60.66667  71.00000  69.00000  82.66667
 [51]  52.00000  71.33333  46.33333  80.33333  80.66667  39.00000  84.33333  52.00000  58.33333   9.00000
 [61]  75.00000  37.33333  59.33333  73.33333  58.66667  64.00000  39.66667  68.66667  58.33333  53.33333
 [71]  64.66667  60.33333  46.66667  58.00000  46.33333  41.00000  26.00000  79.66667  69.00000  66.00000
 [81]  48.66667  46.33333  50.33333  66.33333  38.33333  78.33333  82.33333  72.00000  65.00000  80.33333
 [91]  70.33333  32.33333  73.66667  46.00000  85.66667  80.33333  64.33333  68.33333  62.33333  64.66667
[101]  71.00000  72.00000  88.33333  50.33333  91.33333  65.66667  95.66667  64.33333  66.00000  68.66667
[111]  88.00000  55.33333  51.33333  54.33333  99.66667  78.33333  80.66667  79.66667  58.33333  63.00000
[121]  86.66667  90.66667  91.33333  58.66667  78.66667  89.33333  69.00000  72.00000  79.33333  50.33333
[131]  85.00000  43.33333  77.00000  80.00000  76.00000  53.66667  48.66667  60.33333  64.00000  67.00000
[141]  73.00000  61.66667  50.33333  49.00000  79.66667  31.33333  82.33333  69.00000  74.66667  97.66667
[151]  66.00000  70.66667  65.00000  50.00000  63.33333  82.33333  72.66667  60.00000  78.00000  64.00000
[161]  78.00000  82.66667  51.33333  51.33333  88.00000  98.66667  51.66667  70.66667  76.33333  70.66667
[171]  73.00000  86.66667  82.00000  66.66667  49.33333  86.33333  52.66667  75.00000  61.33333  99.00000
[181]  68.33333  58.66667  49.00000  68.00000  48.66667  65.66667  73.66667  65.33333  48.33333  84.00000
[191]  66.66667  79.33333  64.00000  67.00000  79.33333  56.00000  64.33333  54.00000  51.00000  77.66667
[201]  79.00000  74.33333  71.66667  64.66667  47.33333  74.33333  68.66667  79.00000  77.00000  61.66667
[211]  79.33333  30.00000  54.66667  55.66667  86.33333  80.66667  85.66667  38.33333  71.00000  57.66667
[221]  66.00000  81.66667  60.66667  80.33333  63.66667  51.66667  71.66667  53.66667  68.00000  92.33333
[231]  68.66667  43.66667  78.66667  85.66667  83.00000  77.33333  65.33333  66.00000  52.33333  81.33333
```

6.


Untitled1*
Source on Save
Run
Source
colnames(x)[colnames(x) == 'test.preparation.course'] <- 'prep'
colnames(x)[colnames(x) == 'math.percentage '] <- 'math'
colnames(x)[colnames(x) == 'reading.score.percentage'] <- 'read'
colnames(x)[colnames(x) == 'writing.score.percentage'] <- 'write'
colnames(x)[colnames(x) == 'sex'] <- 'gen'
x$math <- x$math * 100
x$read <- x$read * 100
x$write <- x$write * 100
x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
x$math
x$average
summary_math
summary_read
summary_write
31:14
(Top Level)
R Script
Console
Terminal
Background Jobs
R 4.3.2 · ~/
[851] 68.33333 64.00000 88.33333 70.00000 60.33333 96.66667 69.33333 75.00000 49.00000 77.33333
[861] 56.00000 84.66667 39.66667 74.00000 93.66667 84.00000 54.66667 48.00000 74.66667 50.33333
[871] 54.66667 72.66667 81.33333 87.33333 55.33333 70.00000 82.33333 57.33333 70.33333 71.33333
[881] 64.33333 70.33333 69.33333 48.33333 52.00000 72.66667 96.00000 61.66667 69.33333 47.66667
[891] 87.33333 87.33333 63.33333 79.00000 63.33333 34.66667 30.66667 73.33333 61.33333 75.00000
[901] 86.00000 75.00000 41.00000 97.66667 78.33333 80.66667 52.00000 84.66667 71.33333 68.00000
[911] 46.66667 78.33333 59.66667 58.33333 54.00000 68.00000 100.00000 52.33333 71.33333 92.66667
[921] 68.66667 44.66667 68.00000 61.33333 71.00000 66.00000 57.33333 65.66667 44.33333 51.66667
[931] 70.33333 60.33333 68.33333 73.00000 91.66667 63.66667 59.00000 57.33333 83.66667 71.33333
[941] 70.00000 88.33333 70.33333 61.33333 62.33333 57.66667 81.33333 55.66667 50.33333 68.33333
[951] 79.33333 78.33333 73.33333 54.66667 66.66667 63.66667 84.00000 97.33333 55.66667 75.66667
[961] 59.33333 51.66667 100.00000 72.00000 62.33333 68.00000 66.00000 62.00000 70.33333 79.66667
[971] 96.33333 73.00000 54.33333 58.33333 61.33333 74.33333 60.66667 61.66667 48.00000 93.33333
[981] 18.33333 79.00000 83.33333 85.33333 77.00000 54.00000 50.00000 77.33333 44.66667 78.66667
[991] 80.66667 75.00000 69.00000 69.33333 62.66667 94.00000 57.33333 65.00000 74.33333 83.00000
> summary_math
Min. 1st Qu. Median Mean 3rd Qu. Max.
0.00 57.00 66.00 66.09 77.00 100.00
> summary_read
Min. 1st Qu. Median Mean 3rd Qu. Max.
17.00 59.00 70.00 69.17 79.00 100.00
> summary_write
Min. 1st Qu. Median Mean 3rd Qu. Max.
10.00 57.75 69.00 68.05 79.00 100.00
>

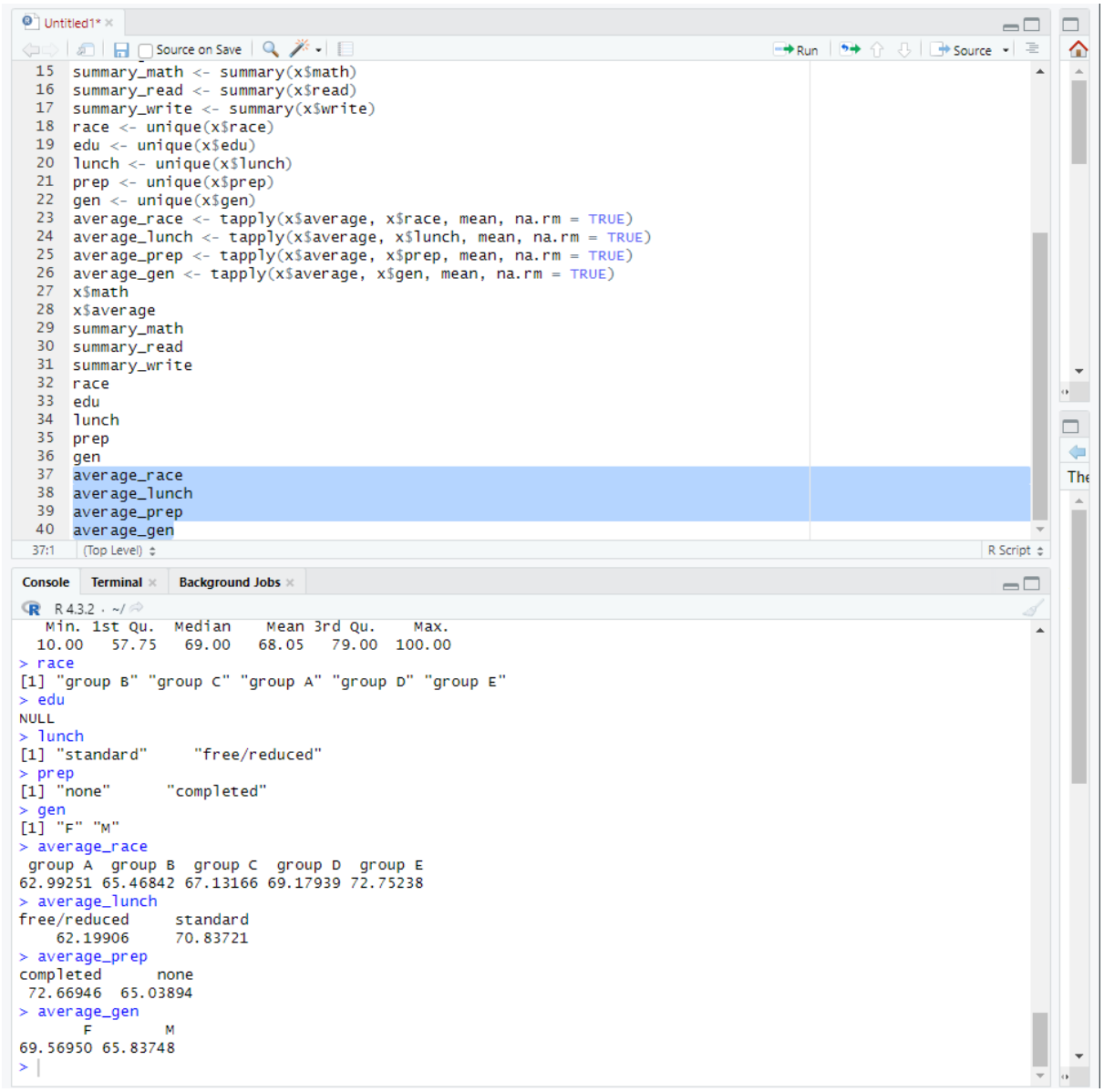
7.



```
x$math <- x$math * 100
x$read <- x$read * 100
x$write <- x$write * 100
x$average <- rowMeans(x[, c("math", "read", "write")], na.rm = TRUE)
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
x$math
x$average
summary_math
summary_read
summary_write
race
edu
lunch
prep
gen
```

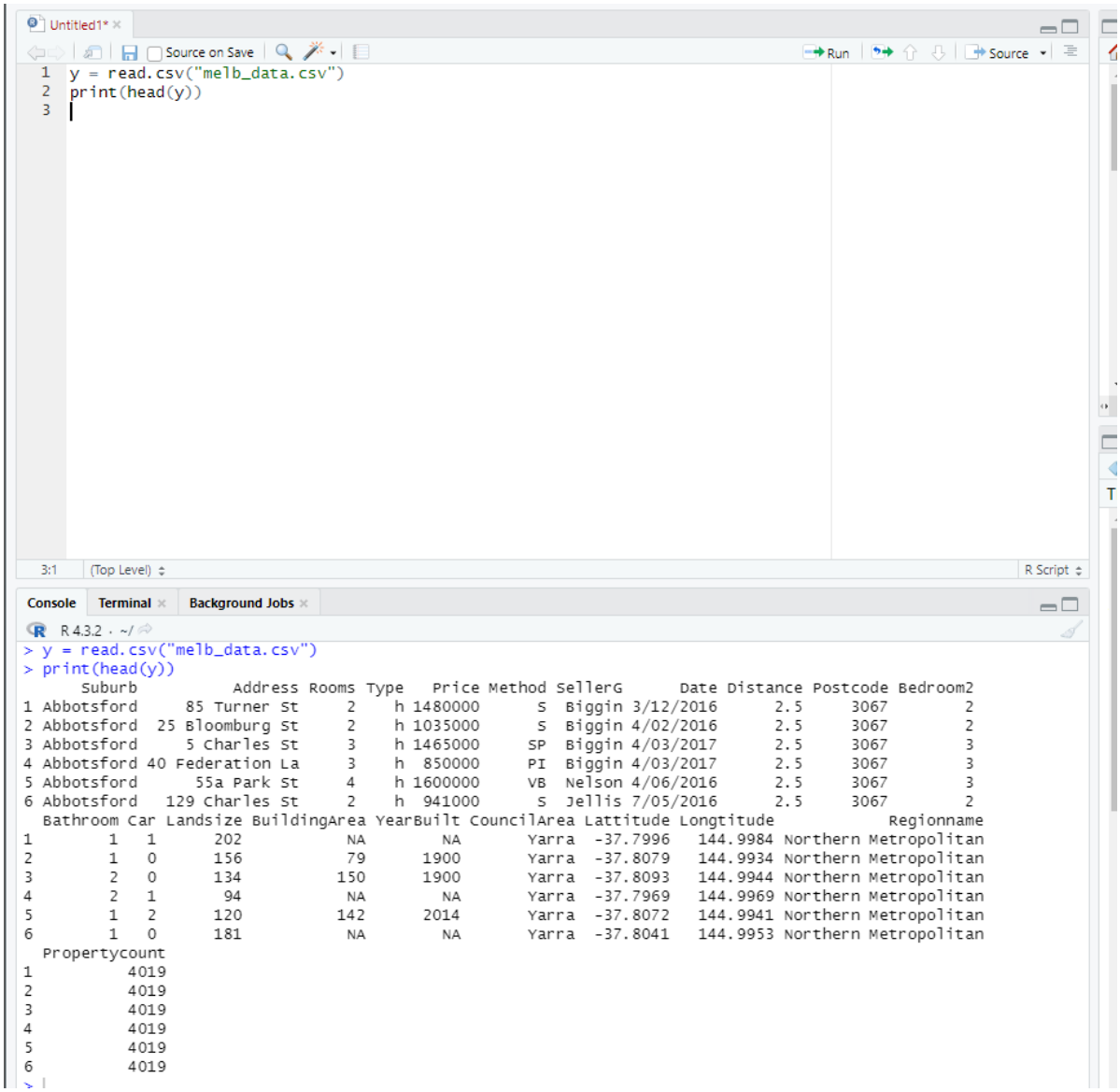
```
 [951]  79.33333  78.33333  73.33333  54.66667  66.66667  63.66667  84.00000  97.33333  55.66667  75.66667
 [961]  59.33333  51.66667 100.00000  72.00000  62.33333  68.00000  66.00000  62.00000  70.33333  79.66667
 [971]  96.33333  73.00000  54.33333  58.33333  61.33333  74.33333  60.66667  61.66667  48.00000  93.33333
 [981]  18.33333  79.00000  83.33333  85.33333  77.00000  54.00000  50.00000  77.33333  44.66667  78.66667
 [991]  80.66667  75.00000  69.00000  69.33333  62.66667  94.00000  57.33333  65.00000  74.33333  83.00000
> summary_math
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   0.00   57.00   66.00   66.09   77.00  100.00
> summary_read
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  17.00   59.00   70.00   69.17   79.00  100.00
> summary_write
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  10.00   57.75   69.00   68.05   79.00  100.00
> race
[1] "group B" "group C" "group A" "group D" "group E"
> edu
NULL
> lunch
[1] "standard"     "free/reduced"
> prep
[1] "none"      "completed"
> gen
[1] "F" "M"
```

8.

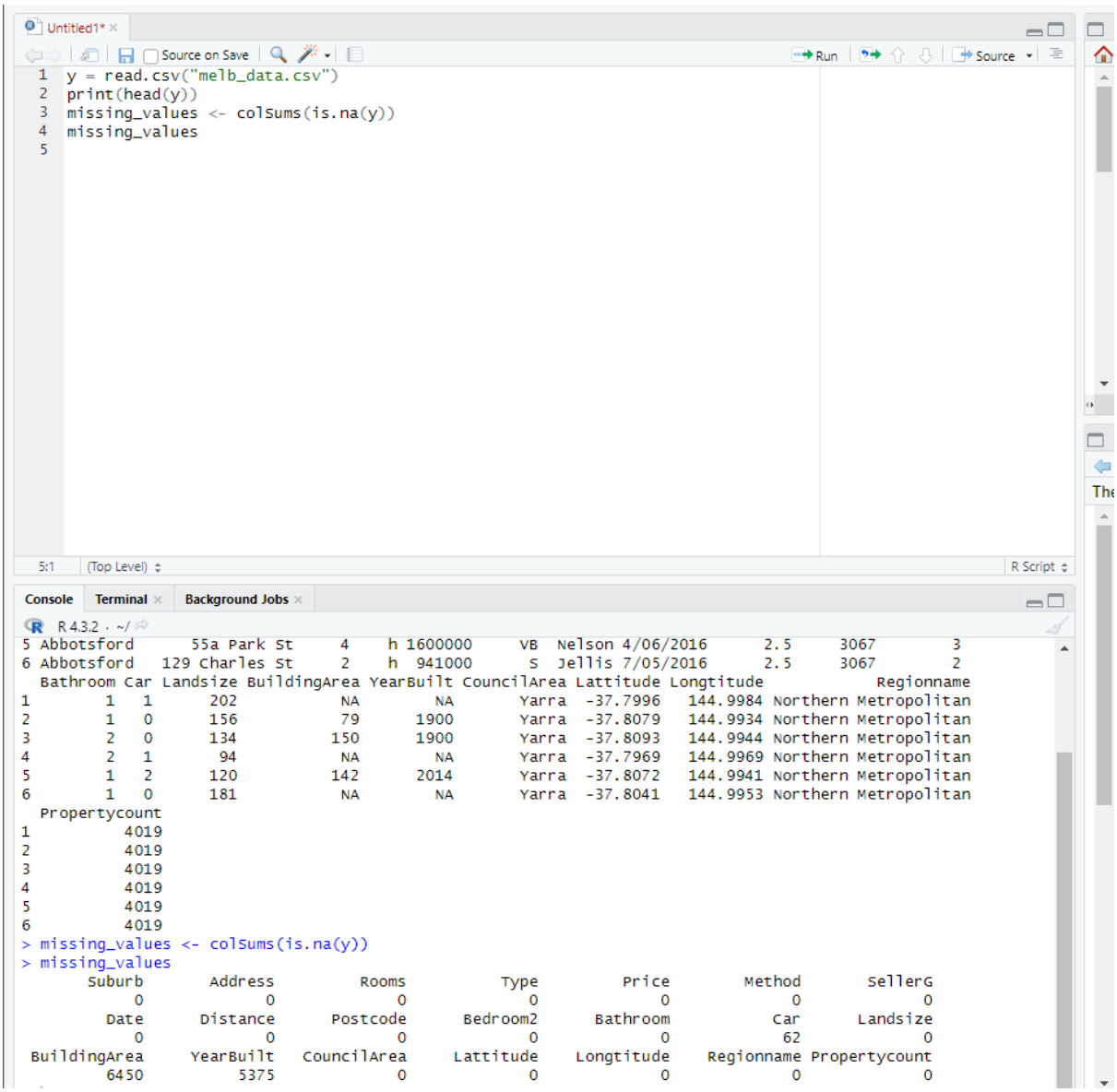

Untitled1*
Source on Save
Run
Source
summary_math <- summary(x$math)
summary_read <- summary(x$read)
summary_write <- summary(x$write)
race <- unique(x$race)
edu <- unique(x$edu)
lunch <- unique(x$lunch)
prep <- unique(x$prep)
gen <- unique(x$gen)
average_race <- tapply(x$average, x$race, mean, na.rm = TRUE)
average_lunch <- tapply(x$average, x$lunch, mean, na.rm = TRUE)
average_prep <- tapply(x$average, x$prep, mean, na.rm = TRUE)
average_gen <- tapply(x$average, x$gen, mean, na.rm = TRUE)
x$math
x$average
summary_math
summary_read
summary_write
race
edu
lunch
prep
gen
average_race
average_lunch
average_prep
average_gen
37:1
(Top Level)
R Script
Console
Terminal
Background Jobs
R 4.3.2 · ~/
Min. 1st Qu. Median Mean 3rd Qu. Max.
10.00 57.75 69.00 68.05 79.00 100.00
> race
[1] "group B" "group C" "group A" "group D" "group E"
> edu
NULL
> lunch
[1] "standard" "free/reduced"
> prep
[1] "none" "completed"
> gen
[1] "F" "M"
> average_race
group A group B group C group D group E
62.99251 65.46842 67.13166 69.17939 72.75238
> average_lunch
free/reduced standard
62.19906 70.83721
> average_prep
completed none
72.66946 65.03894
> average_gen
F M
69.56950 65.83748
>

Activity 2

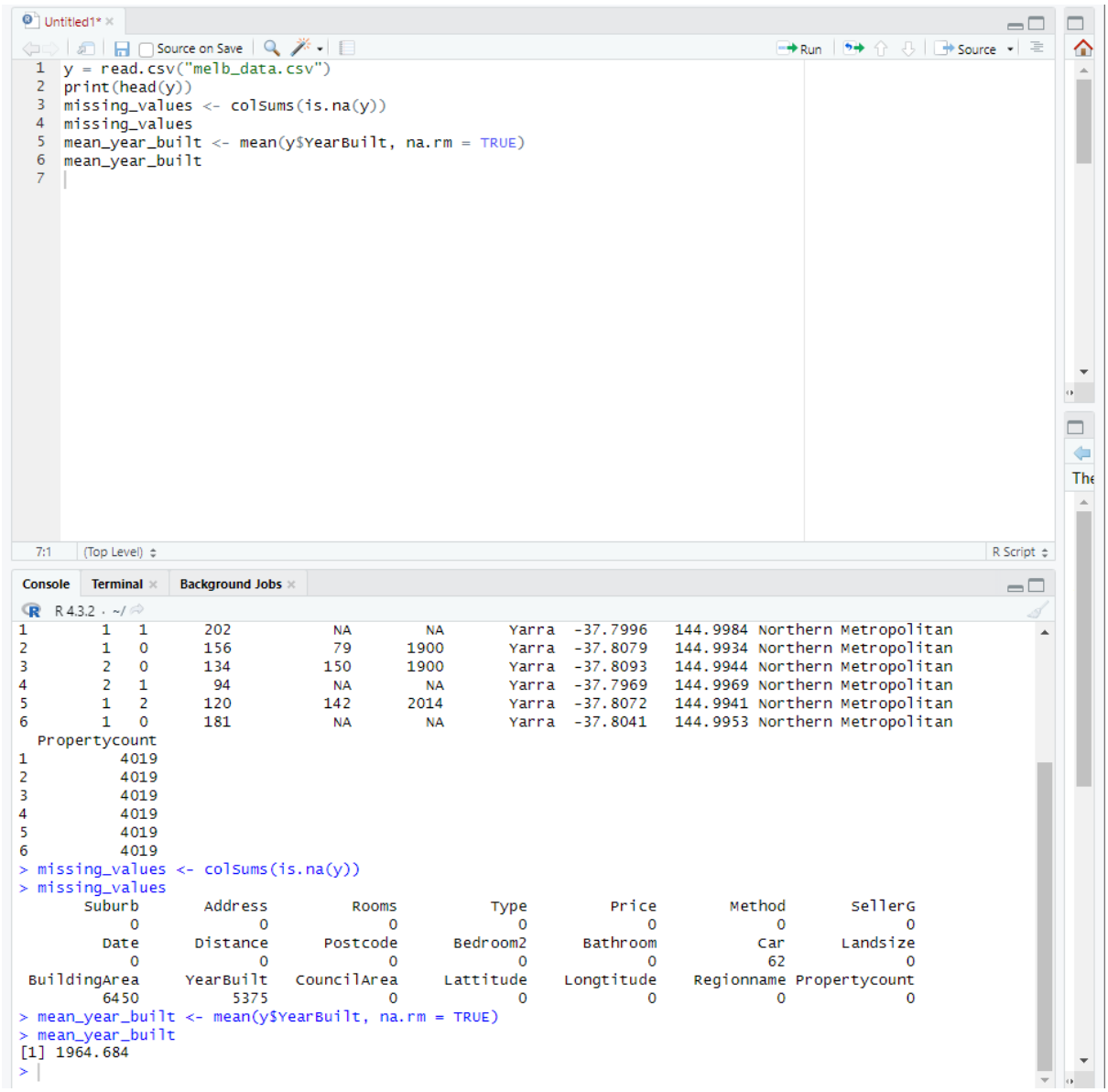
3.


Untitled1*
Source on Save
Run
Source
1 y = read.csv("melb_data.csv")
2 print(head(y))
3
3:1
(Top Level)
R Script
Console
Terminal
Background Jobs
R 4.3.2 · ~/
> y = read.csv("melb_data.csv")
> print(head(y))
Suburb Address Rooms Type Price Method SellerG Date Distance Postcode Bedroom2
1 Abbotsford 85 Turner St 2 h 1480000 S Biggin 3/12/2016 2.5 3067 2
2 Abbotsford 25 Bloomburg St 2 h 1035000 S Biggin 4/02/2016 2.5 3067 2
3 Abbotsford 5 Charles St 3 h 1465000 SP Biggin 4/03/2017 2.5 3067 3
4 Abbotsford 40 Federation La 3 h 850000 PI Biggin 4/03/2017 2.5 3067 3
5 Abbotsford 55a Park St 4 h 1600000 VB Nelson 4/06/2016 2.5 3067 3
6 Abbotsford 129 Charles St 2 h 941000 S Jellis 7/05/2016 2.5 3067 2
Bathroom Car Landsize BuildingArea YearBuilt CouncilArea Lattitude Longtitude Regionname
1 1 1 202 NA NA Yarra -37.7996 144.9984 Northern Metropolitan
2 1 0 156 79 1900 Yarra -37.8079 144.9934 Northern Metropolitan
3 2 0 134 150 1900 Yarra -37.8093 144.9944 Northern Metropolitan
4 2 1 94 NA NA Yarra -37.7969 144.9969 Northern Metropolitan
5 1 2 120 142 2014 Yarra -37.8072 144.9941 Northern Metropolitan
6 1 0 181 NA NA Yarra -37.8041 144.9953 Northern Metropolitan
Propertycount
1 4019
2 4019
3 4019
4 4019
5 4019
6 4019

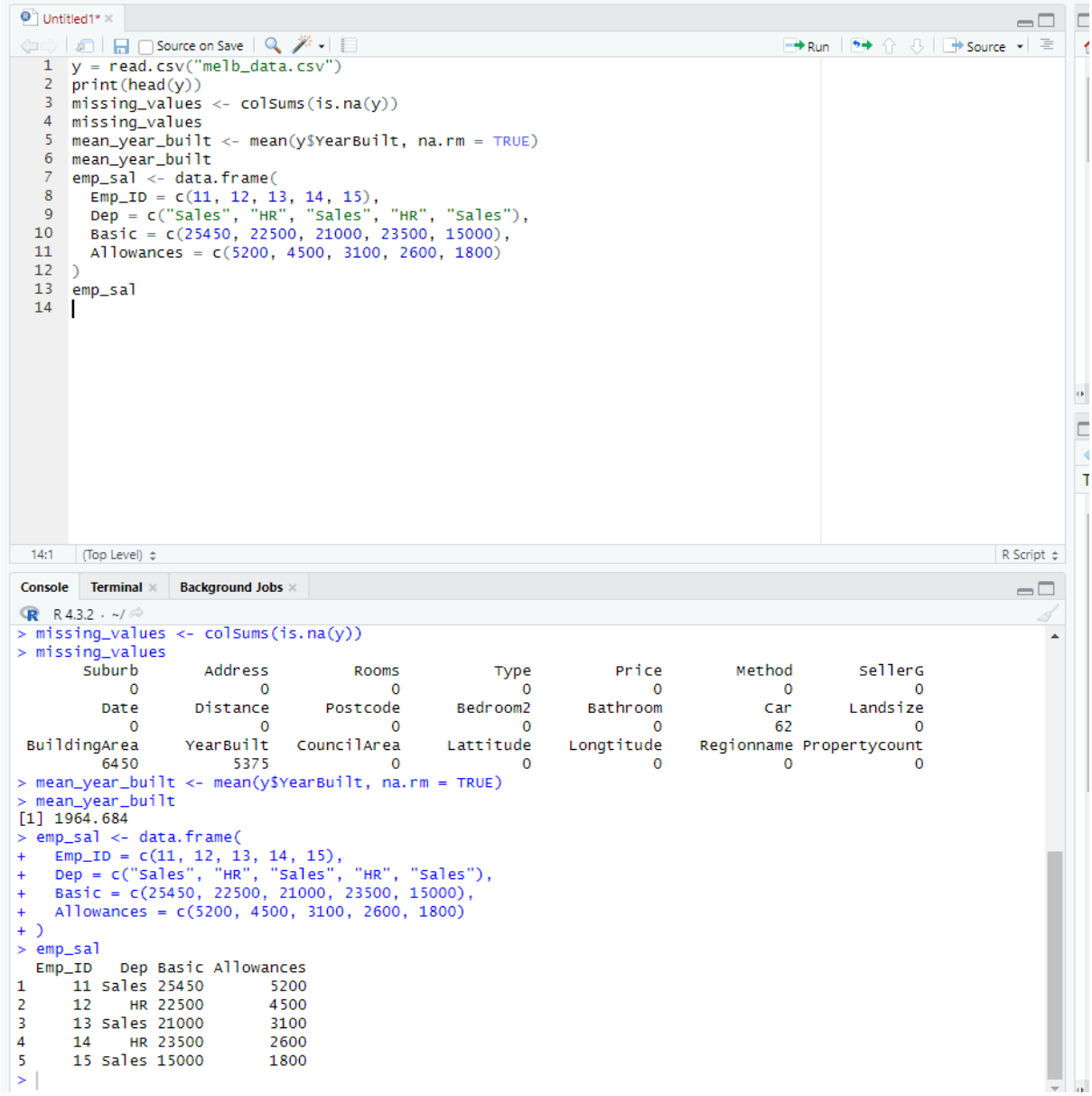
4.


Untitled1*
Source on Save
Run
Source
1 y = read.csv("melb_data.csv")
2 print(head(y))
3 missing_values <- colSums(is.na(y))
4 missing_values
5
5:1
(Top Level)
R Script
Console
Terminal
Background Jobs
R 4.3.2 · ~/
5 Abbotsford 55a Park St 4 h 1600000 VB Nelson 4/06/2016 2.5 3067 3
6 Abbotsford 129 Charles St 2 h 941000 S Jellis 7/05/2016 2.5 3067 2
Bathroom Car Landsize BuildingArea YearBuilt CouncilArea Lattitude Longtitude Regionname
1 1 1 202 NA NA Yarra -37.7996 144.9984 Northern Metropolitan
2 1 0 156 79 1900 Yarra -37.8079 144.9934 Northern Metropolitan
3 2 0 134 150 1900 Yarra -37.8093 144.9944 Northern Metropolitan
4 2 1 94 NA NA Yarra -37.7969 144.9969 Northern Metropolitan
5 1 2 120 142 2014 Yarra -37.8072 144.9941 Northern Metropolitan
6 1 0 181 NA NA Yarra -37.8041 144.9953 Northern Metropolitan
Propertycount
1 4019
2 4019
3 4019
4 4019
5 4019
6 4019
> missing_values <- colSums(is.na(y))
> missing_values
Suburb Address Rooms Type Price Method SellerG
0 0 0 0 0 0 0
Date Distance Postcode Bedroom2 Bathroom Car Landsize
0 0 0 0 0 62 0
BuildingArea YearBuilt CouncilArea Lattitude Longtitude Regionname Propertycount
6450 5375 0 0 0 0 0

5.


Untitled1*
Source on Save
Run
Source
1 y = read.csv("melb_data.csv")
2 print(head(y))
3 missing_values <- colSums(is.na(y))
4 missing_values
5 mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
6 mean_year_built
7
7:1
(Top Level)
R Script
Console
Terminal
Background Jobs
R 4.3.2 · ~/
1 1 1 202 NA NA Yarra -37.7996 144.9984 Northern Metropolitan
2 1 0 156 79 1900 Yarra -37.8079 144.9934 Northern Metropolitan
3 2 0 134 150 1900 Yarra -37.8093 144.9944 Northern Metropolitan
4 2 1 94 NA NA Yarra -37.7969 144.9969 Northern Metropolitan
5 1 2 120 142 2014 Yarra -37.8072 144.9941 Northern Metropolitan
6 1 0 181 NA NA Yarra -37.8041 144.9953 Northern Metropolitan
Propertycount
1 4019
2 4019
3 4019
4 4019
5 4019
6 4019
> missing_values <- colSums(is.na(y))
> missing_values
Suburb Address Rooms Type Price Method SellerG
0 0 0 0 0 0 0
Date Distance Postcode Bedroom2 Bathroom Car Landsize
0 0 0 0 0 62 0
BuildingArea YearBuilt CouncilArea Lattitude Longtitude Regionname Propertycount
6450 5375 0 0 0 0 0
> mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
> mean_year_built
[1] 1964.684
>

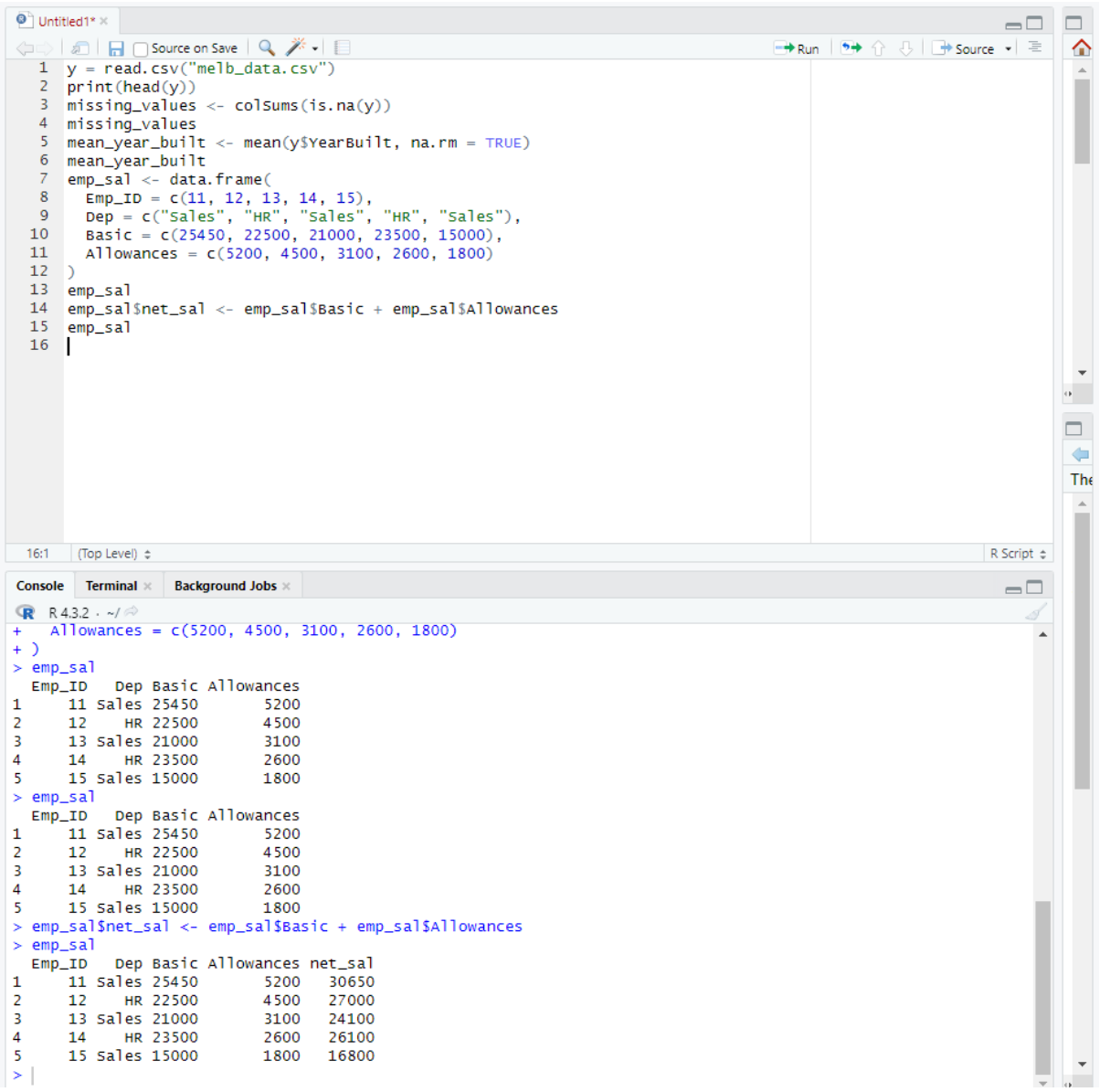
6.



```
y = read.csv("melb_data.csv")
print(head(y))
missing_values <- colSums(is.na(y))
missing_values
mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
mean_year_built
emp_sal <- data.frame(
  Emp_ID = c(11, 12, 13, 14, 15),
  Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
  Basic = c(25450, 22500, 21000, 23500, 15000),
  Allowances = c(5200, 4500, 3100, 2600, 1800)
)
emp_sal
```

```
> missing_values <- colSums(is.na(y))
> missing_values
      Suburb      Address        Rooms         Type        Price       Method      SellerG
           0            0            0            0            0            0            0
        Date     Distance     Postcode     Bedroom2     Bathroom          Car     Landsize
           0            0            0            0            0           62            0
BuildingArea    YearBuilt  CouncilArea    Lattitude    Longtitude   Regionname Propertycount
        6450         5375            0            0            0            0            0
> mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
> mean_year_built
[1] 1964.684
> emp_sal <- data.frame(
+   Emp_ID = c(11, 12, 13, 14, 15),
+   Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
+   Basic = c(25450, 22500, 21000, 23500, 15000),
+   Allowances = c(5200, 4500, 3100, 2600, 1800)
+ )
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
>
```

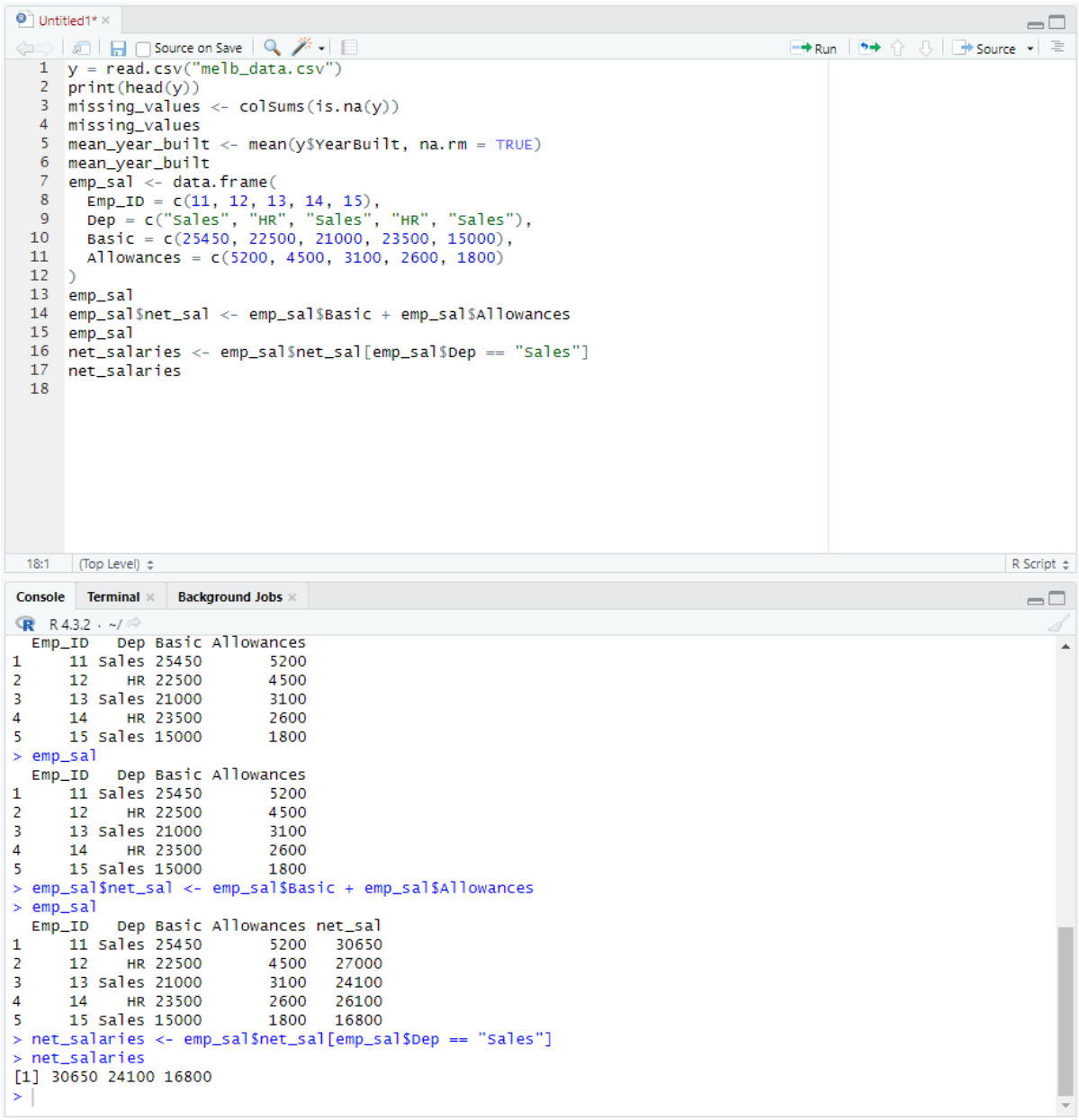
7.



```
y = read.csv("melb_data.csv")
print(head(y))
missing_values <- colSums(is.na(y))
missing_values
mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
mean_year_built
emp_sal <- data.frame(
  Emp_ID = c(11, 12, 13, 14, 15),
  Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
  Basic = c(25450, 22500, 21000, 23500, 15000),
  Allowances = c(5200, 4500, 3100, 2600, 1800)
)
emp_sal
emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
emp_sal
```

```
+   Allowances = c(5200, 4500, 3100, 2600, 1800)
+ )
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
> emp_sal
  Emp_ID   Dep Basic Allowances net_sal
1     11 Sales 25450       5200   30650
2     12    HR 22500       4500   27000
3     13 Sales 21000       3100   24100
4     14    HR 23500       2600   26100
5     15 Sales 15000       1800   16800
>
```

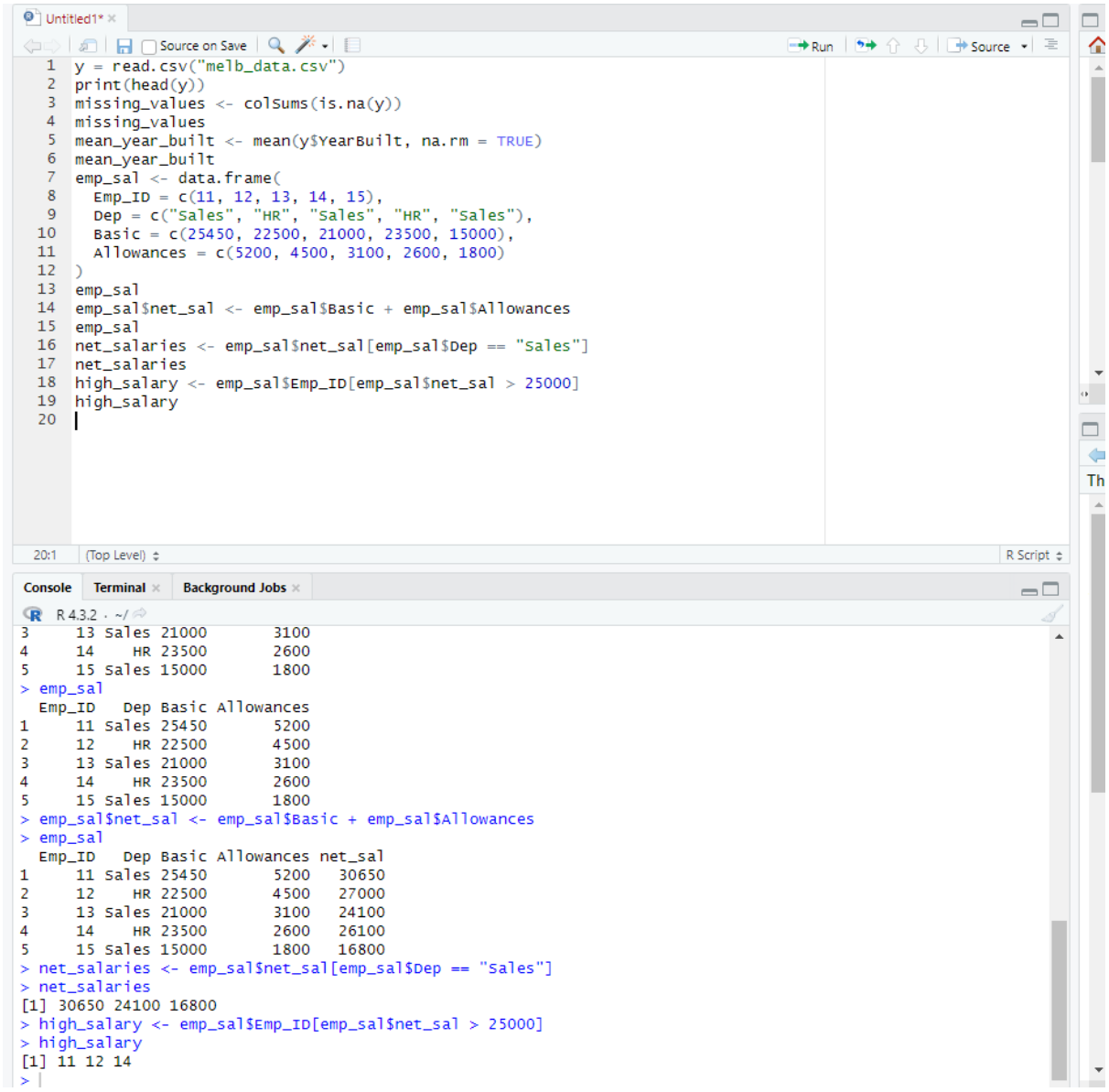
8.



```
y = read.csv("melb_data.csv")
print(head(y))
missing_values <- colSums(is.na(y))
missing_values
mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
mean_year_built
emp_sal <- data.frame(
  Emp_ID = c(11, 12, 13, 14, 15),
  Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
  Basic = c(25450, 22500, 21000, 23500, 15000),
  Allowances = c(5200, 4500, 3100, 2600, 1800)
)
emp_sal
emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
emp_sal
net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
net_salaries
```

```
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
> emp_sal
  Emp_ID   Dep Basic Allowances net_sal
1     11 Sales 25450       5200   30650
2     12    HR 22500       4500   27000
3     13 Sales 21000       3100   24100
4     14    HR 23500       2600   26100
5     15 Sales 15000       1800   16800
> net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
> net_salaries
[1] 30650 24100 16800
>
```

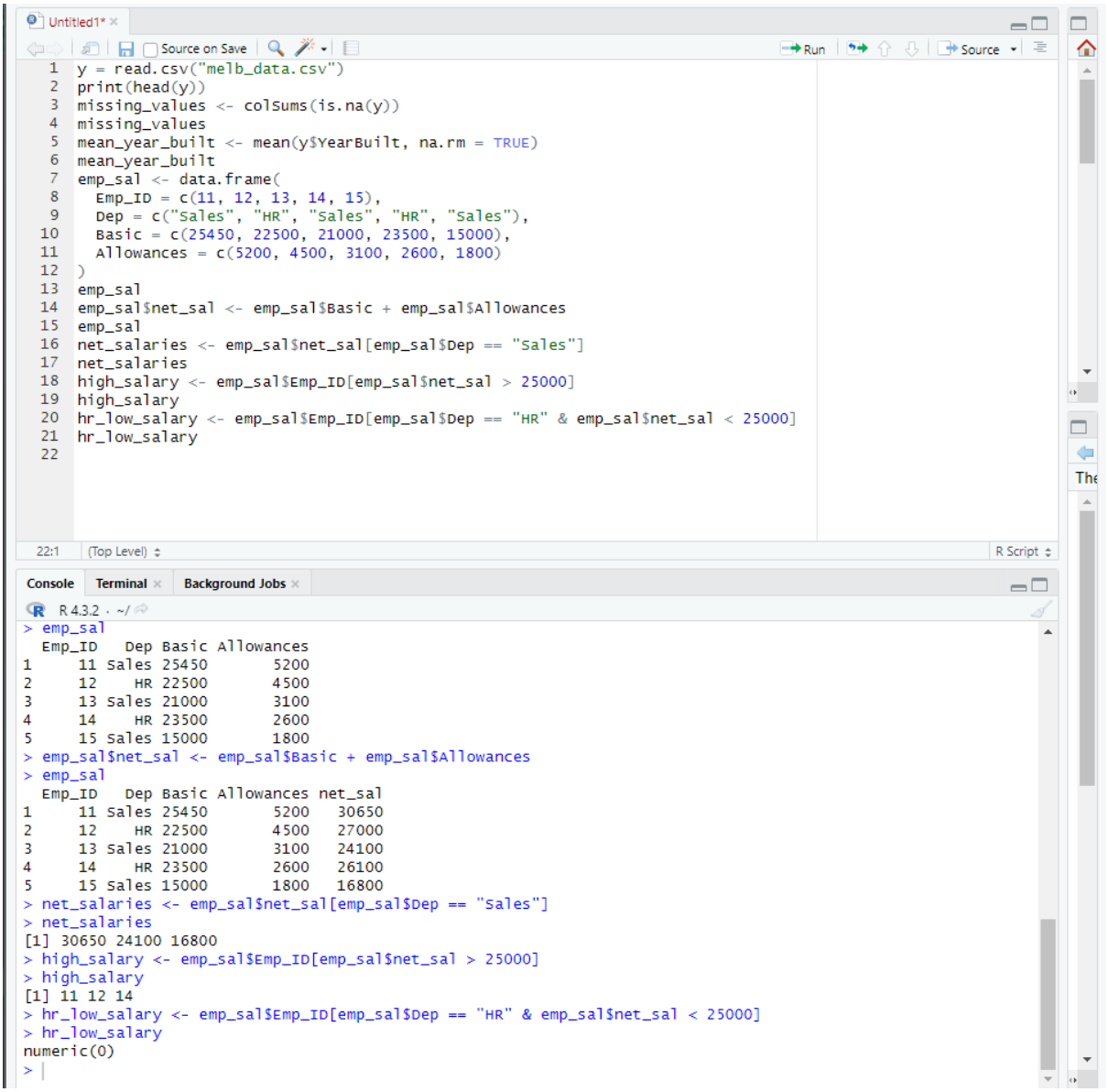
9.



```
y = read.csv("melb_data.csv")
print(head(y))
missing_values <- colSums(is.na(y))
missing_values
mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
mean_year_built
emp_sal <- data.frame(
  Emp_ID = c(11, 12, 13, 14, 15),
  Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
  Basic = c(25450, 22500, 21000, 23500, 15000),
  Allowances = c(5200, 4500, 3100, 2600, 1800)
)
emp_sal
emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
emp_sal
net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
net_salaries
high_salary <- emp_sal$Emp_ID[emp_sal$net_sal > 25000]
high_salary
```

```
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
> emp_sal
  Emp_ID   Dep Basic Allowances net_sal
1     11 Sales 25450       5200   30650
2     12    HR 22500       4500   27000
3     13 Sales 21000       3100   24100
4     14    HR 23500       2600   26100
5     15 Sales 15000       1800   16800
> net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
> net_salaries
[1] 30650 24100 16800
> high_salary <- emp_sal$Emp_ID[emp_sal$net_sal > 25000]
> high_salary
[1] 11 12 14
>
```

10.



```
y = read.csv("melb_data.csv")
print(head(y))
missing_values <- colSums(is.na(y))
missing_values
mean_year_built <- mean(y$YearBuilt, na.rm = TRUE)
mean_year_built
emp_sal <- data.frame(
  Emp_ID = c(11, 12, 13, 14, 15),
  Dep = c("Sales", "HR", "Sales", "HR", "Sales"),
  Basic = c(25450, 22500, 21000, 23500, 15000),
  Allowances = c(5200, 4500, 3100, 2600, 1800)
)
emp_sal
emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
emp_sal
net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
net_salaries
high_salary <- emp_sal$Emp_ID[emp_sal$net_sal > 25000]
high_salary
hr_low_salary <- emp_sal$Emp_ID[emp_sal$Dep == "HR" & emp_sal$net_sal < 25000]
hr_low_salary
```

```
> emp_sal
  Emp_ID   Dep Basic Allowances
1     11 Sales 25450       5200
2     12    HR 22500       4500
3     13 Sales 21000       3100
4     14    HR 23500       2600
5     15 Sales 15000       1800
> emp_sal$net_sal <- emp_sal$Basic + emp_sal$Allowances
> emp_sal
  Emp_ID   Dep Basic Allowances net_sal
1     11 Sales 25450       5200   30650
2     12    HR 22500       4500   27000
3     13 Sales 21000       3100   24100
4     14    HR 23500       2600   26100
5     15 Sales 15000       1800   16800
> net_salaries <- emp_sal$net_sal[emp_sal$Dep == "Sales"]
> net_salaries
[1] 30650 24100 16800
> high_salary <- emp_sal$Emp_ID[emp_sal$net_sal > 25000]
> high_salary
[1] 11 12 14
> hr_low_salary <- emp_sal$Emp_ID[emp_sal$Dep == "HR" & emp_sal$net_sal < 25000]
> hr_low_salary
numeric(0)
>
```