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Number of schools = 898
> nrow(g_schools_byCode)
[1] 898

Number of programs = 165
> nrow(choice_programs)
[1] 165

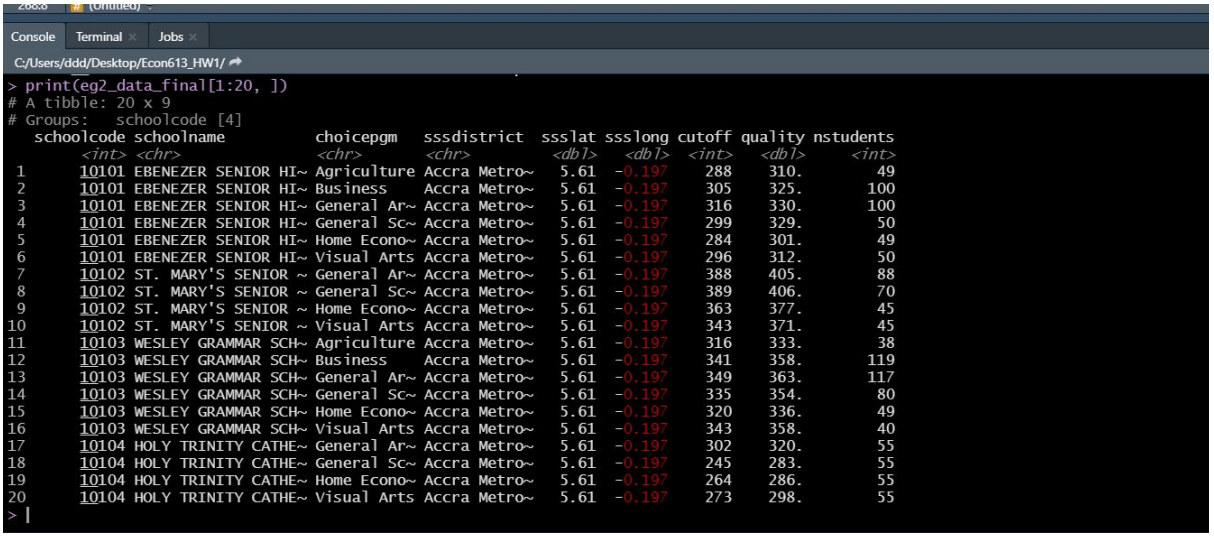
Number of choices (School and Program) = 2773, after dropping the NA values in either schoolcodes or choicepgm
> nrow(potential_choices)
[1] 2773

How many missing test scores = 179887
> sum(is.na(datstu$score))
[1] 179887

numbers of students that apply to the same school = 134122
> length(num_morethan1_school)
[1] 134122

Apply to less than 6 choices = 321639
> nrow(lessthan6_program_df)
[1] 321639

Excercise 2 Data
> print(eg2_data_final[1:20,])



Console Terminal Jobs

C:/Users/ddd/Desktop/Econ613_HW1/

```
> print(eg2_data_final[1:20, ])
# A tibble: 20 x 9
# Groups:   schoolcode [4]
   schoolcode schoolname          choicepgm   sssdistrict  ssslat ssslong cutoff quality nstudents
        <int> <chr>               <chr>       <chr>         <dbl>   <dbl>  <int>   <dbl>     <int>
 1      10101 EBENEZER SENIOR HI~ Agriculture Accra Metro~   5.61  -0.197    288    310.        49
 2      10101 EBENEZER SENIOR HI~ Business    Accra Metro~   5.61  -0.197    305    325.       100
 3      10101 EBENEZER SENIOR HI~ General Ar~ Accra Metro~   5.61  -0.197    316    330.       100
 4      10101 EBENEZER SENIOR HI~ General Sc~ Accra Metro~   5.61  -0.197    299    329.        50
 5      10101 EBENEZER SENIOR HI~ Home Econo~ Accra Metro~   5.61  -0.197    284    301.        49
 6      10101 EBENEZER SENIOR HI~ Visual Arts Accra Metro~   5.61  -0.197    296    312.        50
 7      10102 ST. MARY'S SENIOR ~ General Ar~ Accra Metro~   5.61  -0.197    388    405.        88
 8      10102 ST. MARY'S SENIOR ~ General Sc~ Accra Metro~   5.61  -0.197    389    406.        70
 9      10102 ST. MARY'S SENIOR ~ Home Econo~ Accra Metro~   5.61  -0.197    363    377.        45
10      10102 ST. MARY'S SENIOR ~ Visual Arts Accra Metro~   5.61  -0.197    343    371.        45
11      10103 WESLEY GRAMMAR SCH~ Agriculture Accra Metro~   5.61  -0.197    316    333.        38
12      10103 WESLEY GRAMMAR SCH~ Business    Accra Metro~   5.61  -0.197    341    358.       119
13      10103 WESLEY GRAMMAR SCH~ General Ar~ Accra Metro~   5.61  -0.197    349    363.       117
14      10103 WESLEY GRAMMAR SCH~ General Sc~ Accra Metro~   5.61  -0.197    335    354.        80
15      10103 WESLEY GRAMMAR SCH~ Home Econo~ Accra Metro~   5.61  -0.197    320    336.        49
16      10103 WESLEY GRAMMAR SCH~ Visual Arts Accra Metro~   5.61  -0.197    343    358.        40
17      10104 HOLY TRINITY CATHE~ General Ar~ Accra Metro~   5.61  -0.197    302    320.        55
18      10104 HOLY TRINITY CATHE~ General Sc~ Accra Metro~   5.61  -0.197    245    283.        55
19      10104 HOLY TRINITY CATHE~ Home Econo~ Accra Metro~   5.61  -0.197    264    286.        55
20      10104 HOLY TRINITY CATHE~ Visual Arts Accra Metro~   5.61  -0.197    273    298.        55
>
```

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Exercise 3 Data

```
> print(eg3_for_printing[1:20,])
# A tibble: 20 x 8
# Groups:   schoolcode [1]
   schoolcode sssdistrict       ssslong ssslat jssdistrict              point_x point_y distance
        <int> <chr>               <dbl>  <dbl> <chr>                      <dbl>   <dbl>    <dbl>
 1      10101 Accra Metropolitan  -0.197   5.61 Accra Metropolitan        -0.197    5.61      0
 2      10101 Accra Metropolitan  -0.197   5.61 Aowin Suaman (Enchi)      -2.79     5.79  31988.
 3      10101 Accra Metropolitan  -0.197   5.61 Ga East (Abokobi)         -0.241    5.72     71.1
 4      10101 Accra Metropolitan  -0.197   5.61 Ga West (Amasaman)        -0.398    5.66    206.
 5      10101 Accra Metropolitan  -0.197   5.61 Kumasi Metro              -1.60     6.68  14778.
 6      10101 Accra Metropolitan  -0.197   5.61 Accra Metropolitan        -0.197    5.61      0
 7      10101 Accra Metropolitan  -0.197   5.61 Awutu/Efutu/Senya (Winneba) -0.509  5.54    479.
 8      10101 Accra Metropolitan  -0.197   5.61 Ga West (Amasaman)        -0.398    5.66    206.
 9      10101 Accra Metropolitan  -0.197   5.61 Mfantsiman (Saltpond)     -1.01     5.20   3897.
10      10101 Accra Metropolitan  -0.197   5.61 Accra Metropolitan        -0.197    5.61      0
11      10101 Accra Metropolitan  -0.197   5.61 Ga West (Amasaman)        -0.398    5.66    206.
12      10101 Accra Metropolitan  -0.197   5.61 Wassa West (Tarkwa)       -1.99     5.28  15756.
13      10101 Accra Metropolitan  -0.197   5.61 Accra Metropolitan        -0.197    5.61      0
14      10101 Accra Metropolitan  -0.197   5.61 Awutu/Efutu/Senya (Winneba) -0.509  5.54    479.
15      10101 Accra Metropolitan  -0.197   5.61 Ga West (Amasaman)        -0.398    5.66    206.
16      10101 Accra Metropolitan  -0.197   5.61 Kumasi Metro              -1.60     6.68  14778.
17      10101 Accra Metropolitan  -0.197   5.61 Tema                      -0.0501   5.69    135.
18      10101 Accra Metropolitan  -0.197   5.61 Accra Metropolitan        -0.197    5.61      0
19      10101 Accra Metropolitan  -0.197   5.61 Awutu/Efutu/Senya (Winneba) -0.509  5.54    479.
20      10101 Accra Metropolitan  -0.197   5.61 Dangme East (Ada)          0.107    5.91    889.
>
```

Exercise 4 Data

> g_datstu_school_program_jssdistrict_final

```
> g_datstu_school_program_jssdistrict_final
# A tibble: 6 x 7
   rank avg_cutoff sd_cutoff avg_quality sd_quality avg_distance sd_distance
* <int>      <dbl>     <dbl>       <dbl>      <dbl>        <dbl>       <dbl>
1     1       300.      51.9        307.       50.4        8581.      20728.
2     2       293.      48.6        299.       47.3        6849.      17256.
3     3       283.      44.2        289.       42.5        5698.      15484.
4     4       271.      40.6        278.       38.4        4809.      14464.
5     5       243.      26.7        250.       26.7        2157.       4442.
6     6       244.      27.0        250.       26.2        2115.       5520.
>
```

>datstu_school_program_jssdistrict_quantile_final

```
> datstu_school_program_jssdistrict_quantile_final
# A tibble: 4 x 7
  quantilegroup avg_cutoff sd_cutoff avg_quality sd_quality avg_distance sd_distance
*         <int>      <dbl>     <dbl>       <dbl>      <dbl>        <dbl>       <dbl>
1             1       232.      12.7        235.       10.8        4320.      14202.
2             2       265.       9.13       267.        8.22       5446.      16738.
3             3       299.      11.8        302.       10.9        5559.      16028.
4             4       350.      22.7        354.       23.3        5828.      14425.
>
```

Exercise 6

- cor(x1, y) = 0.216015
- >est_eg6

```
> est_eg6
            True parameter R: GLM : est  R: GLM :se R: own : est  R: own :se
(Intercept)            0.5    2.4907098 0.040620200    2.4907098 0.040620200
x1                     1.2    1.1976226 0.017358550    1.1976226 0.017358550
x2                    -0.9   -0.8970514 0.002876599   -0.8970514 0.002876599
x3                     0.1    0.0875850 0.021694530    0.0875850 0.021694530
```

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Exercise 7

Probit

```
> est_probit
            True parameter R: GLM : est R: GLM :se R: own : est R: own :se
(Intercept)            0.5   3.04273897 0.09980833   3.04291992 0.10007901
x1                     1.2   1.17235282 0.04287054   1.17226371 0.04292037
x2                    -0.9  -0.90546040 0.01856071  -0.90545759 0.01858976
x3                     0.1  -0.01124978 0.04651168  -0.01128529 0.04647593
```

Logit

```
> est_logit
            True parameter R: GLM : est R: GLM :se R: own : est R: own :se
(Intercept)            0.5   5.42654014 0.18557270   5.42655751 0.18557823
x1                     1.2   2.10059417 0.07936026   2.10060264 0.07936256
x2                    -0.9  -1.61850702 0.03670791  -1.61851304 0.03670969
x3                     0.1  -0.01963017 0.08323153  -0.01962943 0.08323301
```

Linear

```
> est_linear
            True parameter R: GLM : est  R: GLM :se R: own : est  R: own :se
(Intercept)            0.5  0.885823611 0.013655728  0.885823611 0.013655728
x1                     1.2  0.146193985 0.005835610  0.146193985 0.005835610
x2                    -0.9 -0.102832042 0.000967057 -0.102832042 0.000967057
x3                     0.1 -0.008053057 0.007293283 -0.008053057 0.007293283
```

In all 3 models, intercept, x1, x2 are very significant, but x3 is not.

Exercise 8

- Marginal effect (Probit)

```
> est_ME_probit
    BT: mean_ME   BT: sd_ME
x0  0.381122225 0.012167275
x1  0.147429134 0.005471467
X2 -0.113682432 0.002121301
X3 -0.001514196 0.005574479
```

- Marginal effect (Logit)

```
> est_ME_logit
    BT: mean_ME   BT: sd_ME
x0  0.381122225 0.012167275
x1  0.147429134 0.005471467
X2 -0.113682432 0.002121301
X3 -0.001514196 0.005574479
```