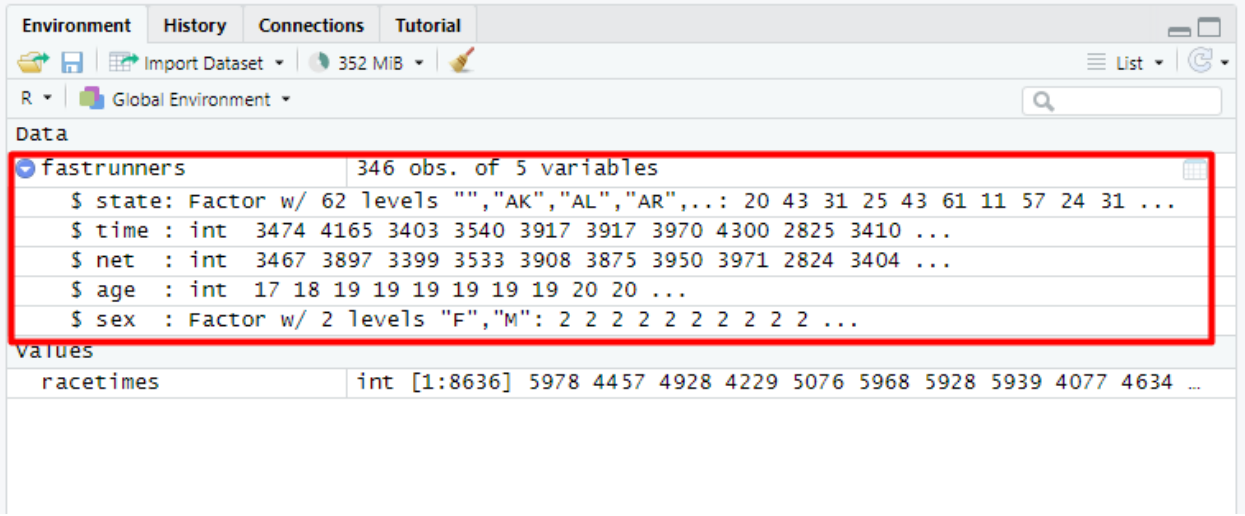
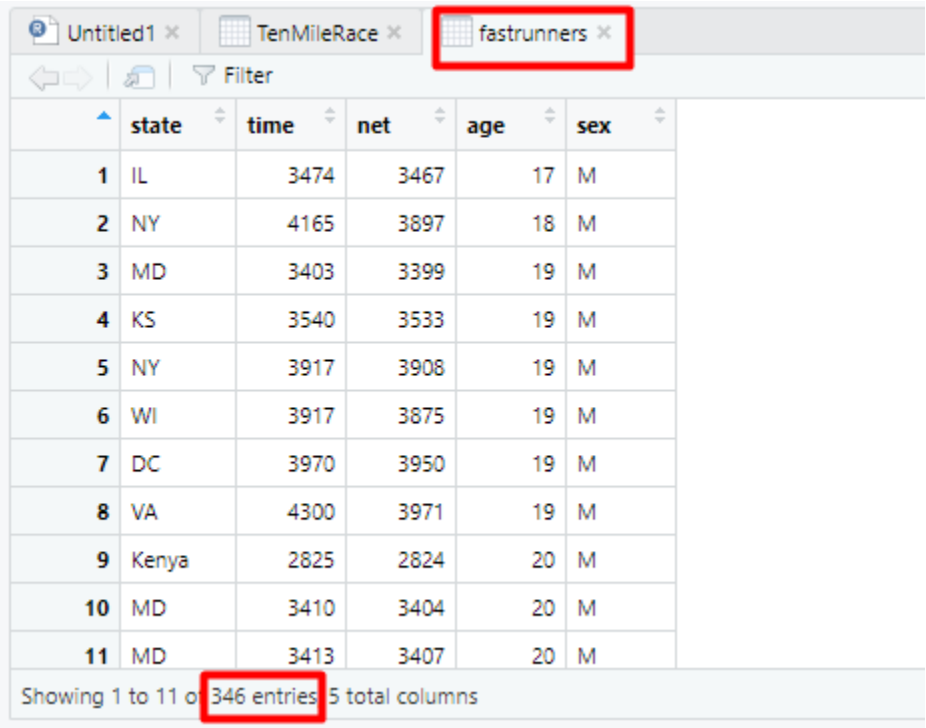
1.

```
> fastrunners=filter(TenMileRace,net<4000)
> View(fastrunners)
> nrow(fastrunners)
[1] 346
```




2.

a.

```
> femalerunners=filter(TenMileRace,sex=="F")
> View(femalerunners)
> nrow(femalerunners)
[1] 4325
```

b.

```
> foreignrunners=filter(TenMileRace,stri_length(state)>2)
> View(foreignrunners)
> nrow(foreignrunners)
[1] 32
>
```

3.

```
> table(TenMileRace$state)

                    AK           AL           AR    Australia
             1       1            2            1            1
            AZ      CA           CO     Colombia           CT
             3      23            7            1           35
            DC      DE           EN     Ethiopia           FL
          1642      20            1            2           20
            GA      GE           HI           IA           IL
            23       2            2           11           32
            IM      IN        Japan        Kenya           KS
             1       7            2           14            8
            KY      LA           LE   Lithuania           MA
             3       7            1            1           63
            MD      ME           MI           MN           MO
          2166      15           17           11           10
            NC      ND           NE  New Zealand           NH
            54       1            1            1           11
            NJ      NM           NY           OH           OR
            92       4          211           34            6
            PA      RI      Romania       Russia           SA
           273       1            3            3            2
            SC      TN           TX     Uhwiesen      Ukraine
             2       9           24            2            1
          Usa      VA           VI           VT           WA
             1    3689            2            9            4
            WI      WV
            17      23
```

4.

```
> femalefastrunners=filter(fastrunners,sex=="F")
```

```
> malerunners=filter(TenMileRace,sex=="M")
> View(malerunners)
```

```
> malerunnersFasterThanFastestFemalerunners=filter(malerunners,net<min(femalefastrunners$net))
> View(malerunnersFasterThanFastestFemalerunners)
> range(malerunnersFasterThanFastestFemalerunners$net)
[1] 2814 3120
```

```
> nrow(malerunnersFasterThanFastestFemalerunners)
[1] 21
```

5.

I have two solutions for question 5 that provide the same output histogram.

Solution 1:

```
> totalRunners=nrow(TenMileRace)
> toprunners=totalRunners*(1-0.05)
> bottomrunners=totalRunners*0.05
```

```
> typical_runners=filter(TenMileRace,rank(TenMileRace$net)<toprunners&rank(TenMileRace
$net)>bottomrunners)
```

```
> hist(typical_runners$net)
```

Solution 2:

```
> sortedRacetimes=sort(racetimes)
```

```
> max=quantile(sortedRacetimes, 0.05)
> min=quantile(sortedRacetimes, 1-0.05)
```

```
> typicalRunners=sortedRacetimes[which(sortedRacetimes>=max & sortedRacetimes<=min)]
> hist(typicalRunners)
```