

Passage 24 A #2

The World Population

We have seen that the world population has reached 7.3 billion in 2015.

```
In[1]:= CountryData["World", "Population"]
```

```
Out[1]= 7.13001 × 109 people
```

```
In[2]:= CountryData["World", {"Population", 1970}]
```

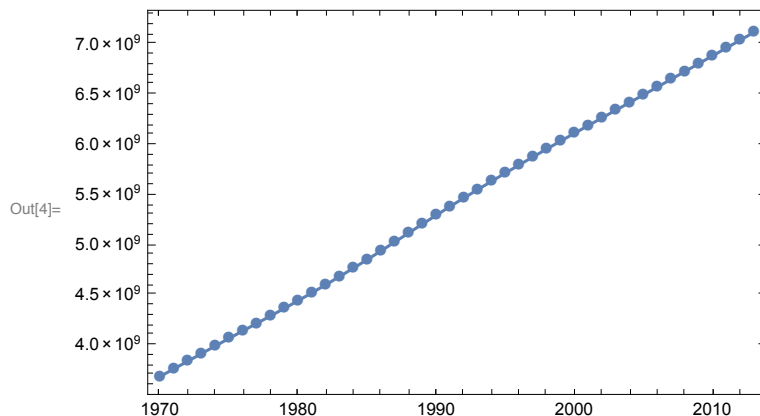
```
Out[2]= 3.69619 × 109 people
```

We connect to a data base to retrieve various data.

```
In[3]:= data = CountryData["World", {"Population", All}]
```

```
Out[3]= TimeSeries [   Time: 01 Jan 1970 to 01 Jan 2013  
Data points 44 ]
```

```
In[4]:= DateListPlot[data, PlotMarkers -> Automatic]
```



Country by country population

Today, we are going to see population country by country. Let's start with Japan.

```
In[5]:= CountryData["Japan", "Population"]
```

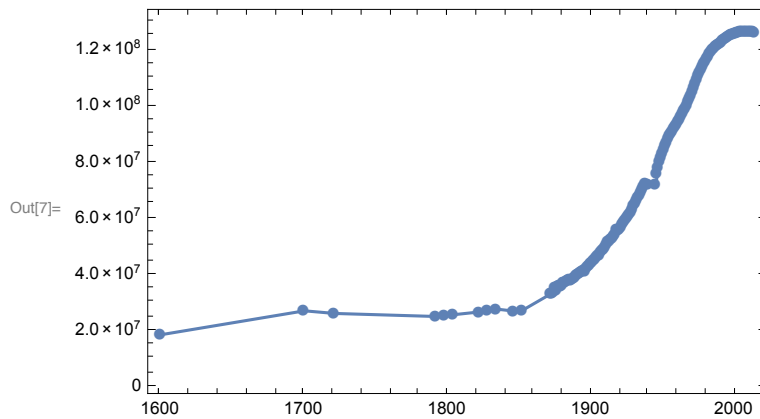
```
Out[5]= 126 225 259 people
```

```
In[6]:= dataJP = CountryData["Japan", {"Population", All}]
```

```
Out[6]= TimeSeries [   Time: 01 Jan 1600 to 01 Jan 2014  
Data points 149 ]
```

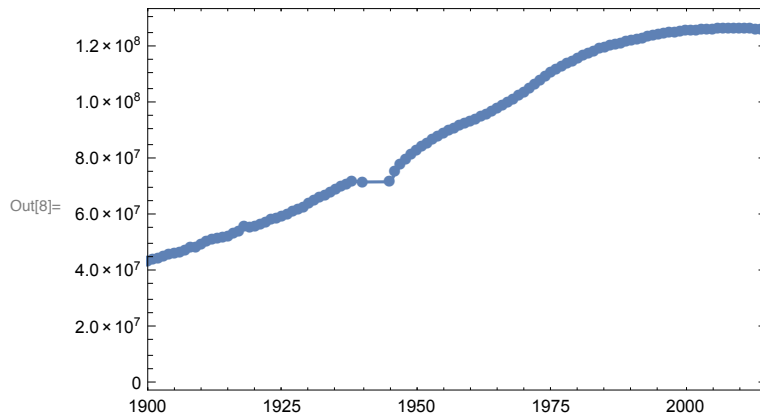
Data is available since 1600!

```
In[7]:= DateListPlot[dataJP, PlotMarkers -> Automatic]
```

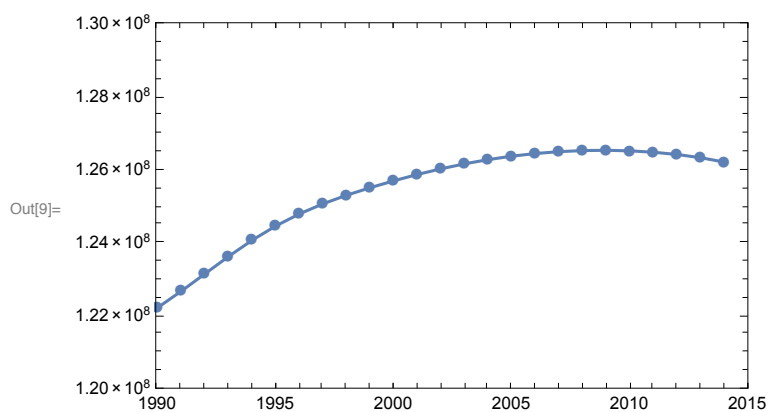


Some data are missing during the war. Japanese population had been increasing every year after the war. But it has just started to decline.

```
In[8]:= DateListPlot[dataJP, PlotMarkers -> Automatic,
  PlotRange -> {{DateList["1900"], DateList["2015"]}, All}]
```



```
In[9]:= DateListPlot[dataJP, PlotMarkers -> Automatic,
  PlotRange -> {{DateList["1990"], DateList["2015"]}, {1.2 x 10^8, 1.3 x 10^8}}]
```



Let's see the population of USA.

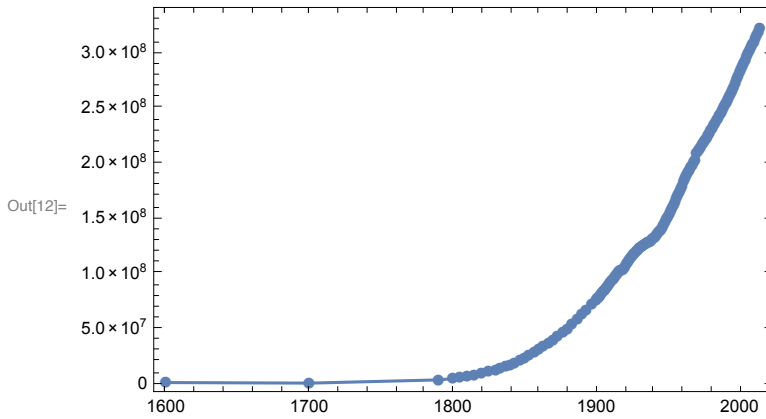
```
In[10]:= CountryData["USA", "Population"]
```

Out[10]= 322 422 965 people

```
In[11]:= dataUSA = CountryData["USA", {"Population", All}]
```

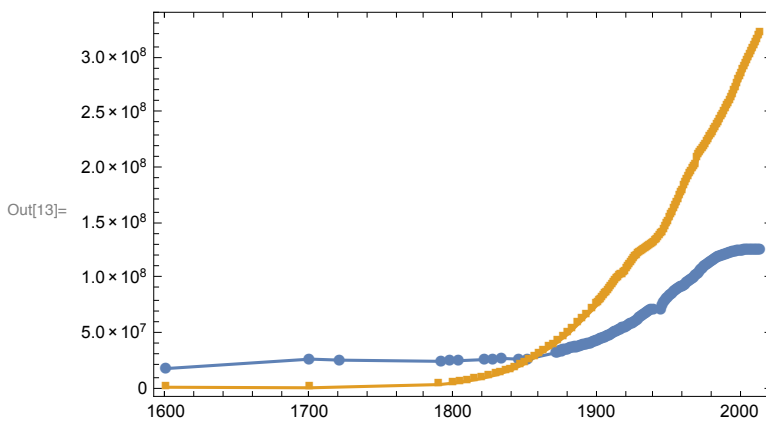
```
Out[11]= TimeSeries [  Time: 01 Jan 1600 to 01 Jan 2014  
Data points 145 ]
```

```
In[12]:= DateListPlot[dataUSA, PlotMarkers -> Automatic]
```



It's obvious that USA is much more populous than Japan and it is still increasing in the population.

```
In[13]:= DateListPlot[{dataJP, dataUSA}, PlotMarkers -> Automatic]
```




How about China, the most populous country in the world?

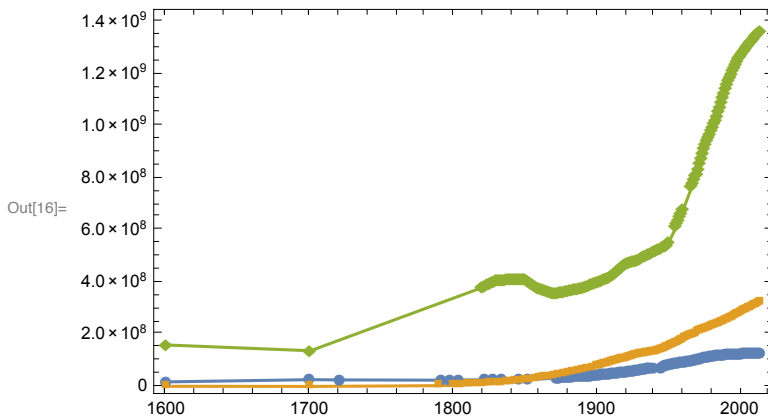
```
In[14]:= CountryData["China", "Population"]
```

```
Out[14]= 1 364 773 138 people
```

```
In[15]:= dataChina = CountryData["China", {"Population", All}]
```

```
Out[15]= TimeSeries [  Time: 01 Jan 1600 to 01 Jan 2014  
Data points 188 ]
```

```
In[16]:= DateListPlot[{dataJP, dataUSA, dataChina}, PlotMarkers -> Automatic]
```



The database has various information about many countries.

```
In[17]:= CountryData["Countries"]
```

```
Out[17]:= { Afghanistan , Albania , Algeria , American Samoa , Andorra , Angola , Anguilla ,
Antigua and Barbuda , Argentina , Armenia , Aruba , Australia , Austria ,
Azerbaijan , Bahamas , Bahrain , Bangladesh , Barbados , Belarus , Belgium ,
Belize , Benin , Bermuda , Bhutan , Bolivia , Bosnia and Herzegovina ,
Botswana , Brazil , British Virgin Islands , Brunei , Bulgaria , Burkina Faso ,
Burundi , Cambodia , Cameroon , Canada , Cape Verde , Cayman Islands ,
Central African Republic , Chad , Chile , China , Christmas Island ,
Cocos Keeling Islands , Colombia , Comoros , Cook Islands , Costa Rica , Croatia ,
Cuba , Curacao , Cyprus , Czech Republic , Democratic Republic of the Congo ,
Denmark , Djibouti , Dominica , Dominican Republic , East Timor , Ecuador ,
Egypt , El Salvador , Equatorial Guinea , Eritrea , Estonia , Ethiopia ,
Falkland Islands , Faroe Islands , Fiji , Finland , France , French Guiana ,
French Polynesia , Gabon , Gambia , Gaza Strip , Georgia , Germany ,
Ghana , Gibraltar , Greece , Greenland , Grenada , Guadeloupe , Guam ,
Guatemala , Guernsey , Guinea , Guinea-Bissau , Guyana , Haiti , Honduras ,
Hong Kong , Hungary , Iceland , India , Indonesia , Iran , Iraq , Ireland ,
Isle of Man , Israel , Italy , Ivory Coast , Jamaica , Japan , Jersey ,
Jordan , Kazakhstan , Kenya , Kiribati , Kosovo , Kuwait , Kyrgyzstan ,
Laos , Latvia , Lebanon , Lesotho , Liberia , Libya , Liechtenstein ,
Lithuania , Luxembourg , Macau , Macedonia , Madagascar , Malawi ,
```

Malaysia , Maldives , Mali , Malta , Marshall Islands , Martinique , Mauritania ,
 Mauritius , Mayotte , Mexico , Micronesia , Moldova , Monaco , Mongolia ,
 Montenegro , Montserrat , Morocco , Mozambique , Myanmar , Namibia ,
 Nauru , Nepal , Netherlands , New Caledonia , New Zealand , Nicaragua ,
 Niger , Nigeria , Niue , Norfolk Island , Northern Mariana Islands , North Korea ,
 Norway , Oman , Pakistan , Palau , Panama , Papua New Guinea ,
 Paraguay , Peru , Philippines , Pitcairn Islands , Poland , Portugal ,
 Puerto Rico , Qatar , Republic of the Congo , Réunion , Romania , Russia ,
 Rwanda , Saint Helena, Ascension and Tristan da Cunha , Saint Kitts and Nevis ,
 Saint Lucia , Saint Pierre and Miquelon , Saint Vincent and the Grenadines , Samoa ,
 San Marino , São Tomé and Príncipe , Saudi Arabia , Senegal , Serbia ,
 Seychelles , Sierra Leone , Singapore , Sint Maarten , Slovakia , Slovenia ,
 Solomon Islands , Somalia , South Africa , South Korea , South Sudan ,
 Spain , Sri Lanka , Sudan , Suriname , Svalbard , Swaziland , Sweden ,
 Switzerland , Syria , Taiwan , Tajikistan , Tanzania , Thailand , Togo ,
 Tokelau , Tonga , Trinidad and Tobago , Tunisia , Turkey , Turkmenistan ,
 Turks and Caicos Islands , Tuvalu , Uganda , Ukraine , United Arab Emirates ,
 United Kingdom , United States , United States Virgin Islands , Uruguay , Uzbekistan ,
 Vanuatu , Vatican City , Venezuela , Vietnam , Wallis and Futuna Islands ,
 West Bank , Western Sahara , Yemen , Zambia , Zimbabwe }

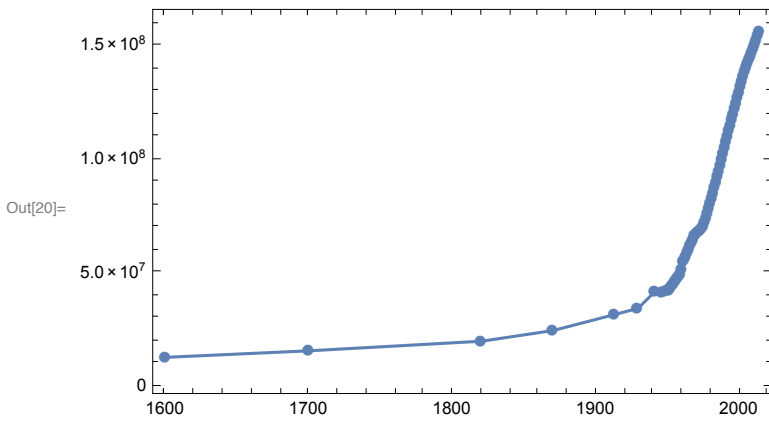
In[18]:= **CountryData["Bangladesh", "Population"]**

Out[18]= 156 380 192 people

In[19]:= **data = CountryData["Bangladesh", {"Population", All}]**

Out[19]= **TimeSeries** [ Time: 01 Jan 1600 to 01 Jan 2014
Data points 74]

In[20]:= **DateListPlot**[data, PlotMarkers → Automatic]



In[21]:= **CountryData**["Bangladesh", "Shape"]



In[22]:= **CountryData**["Sweden", "Population"]

Out[22]= 9 595 619 people

In[23]:= **CountryData**["Sweden", "Shape"]



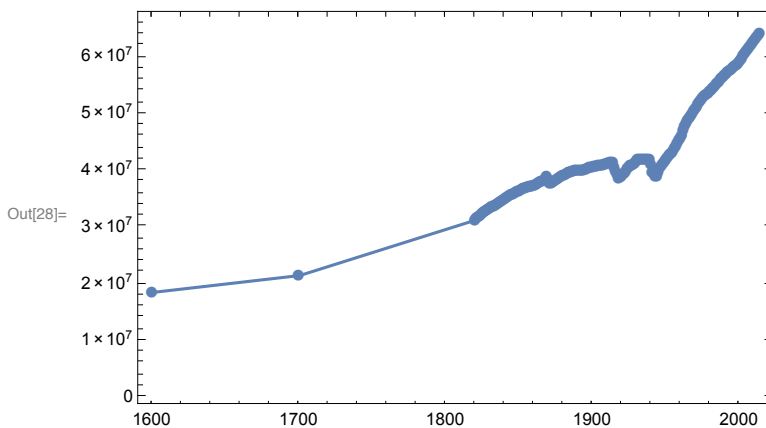
In[24]:= **CountryData**["Sweden", "LifeExpectancy"]

Out[24]= 81.818 yr

In[25]:= **CountryData**["France", "Shape"]



```
In[28]:= DateListPlot[CountryData["France", {"Population", All}], PlotMarkers -> Automatic]
```



```
In[27]:= CountryData["Properties"]
```

```
Out[27]= {AdultPopulation, AgriculturalProducts, AgriculturalValueAdded, Airports,
AlternateNames, AlternateStandardNames, AMRadioStations, AnnualBirths,
AnnualDeaths, AnnualHIV/AIDSDeaths, ArableLandArea, ArableLandFraction, Area,
BirthRateFraction, BorderingCountries, BordersLengths, BoundaryLength,
CallingCode, CapitalCity, CapitalLocation, CapitalLocationLink,
CellularPhones, CenterCoordinates, CenterLocationLink, ChildPopulation,
Classes, ClimateTypes, CoastlineLength, ConstructionValueAdded,
Continent, Coordinates, Countries, CountryCode, CropsLandArea,
CropsLandFraction, CurrencyCode, CurrencyName, CurrencyShortName,
CurrencyUnit, CurrentAccountBalance, DeathRateFraction, Dependencies,
DependencyParent, EconomicAid, ElderlyPopulation, ElectricalGridFrequency,
ElectricalGridPlugImages, ElectricalGridPlugs, ElectricalGridSocketImages,
ElectricalGridSockets, ElectricalGridVoltages, ElectricityConsumption,
ElectricityExports, ElectricityImports, ElectricityProduction,
EnvironmentalAgreements, EnvironmentalIssues, EthnicGroups,
EthnicGroupsFractions, ExchangeRate, ExpenditureFractions, ExportCommodities,
ExportPartners, ExportPartnersFractions, ExportValue, ExternalDebt,
FemaleAdultPopulation, FemaleChildPopulation, FemaleElderlyPopulation,
FemaleInfantMortalityFraction, FemaleLifeExpectancy, FemaleLiteracyFraction,
FemaleMedianAge, FemalePopulation, FiscalYearDate, FixedInvestment, Flag,
FlagDescription, FMRadioStations, ForeignExchangeReserves, ForeignOwnedShips,
ForeignRegisteredShips, FullCoordinates, FullName, FullNativeName,
FullPolygon, GDP, GDPAtParity, GDPPerCapita, GDPRealGrowth, GDPSectorFractions,
GiniIndex, GovernmentConsumption, GovernmentDebt, GovernmentExpenditures,
GovernmentReceipts, GovernmentSurplus, GrossInvestment, Groups,
HighestElevation, HighestPoint, HIV/AIDSDeathRateFraction, HIV/AIDSFraction,
HIV/AIDSPopulation, HouseholdConsumption, ImportCommodities, ImportPartners,
ImportPartnersFractions, ImportValue, IndependenceDate, IndependenceYear,
IndustrialProductionGrowth, IndustrialValueAdded, InfantMortalityFraction,
InfectiousDiseases, InflationRate, InternationalOrganizations,
InternationalOrganizationsObserver, InternetCode, InternetHosts, InternetUsers,
InventoryChange, IrrigatedLandArea, IrrigatedLandFraction, ISOName,
LaborForce, LandArea, Languages, LanguagesDialects, LanguagesFractions,
LargestCities, LifeExpectancy, LiteracyFraction, LowestElevation, LowestPoint,
MajorIndustries, MajorPorts, MaleAdultPopulation, MaleChildPopulation,
MaleElderlyPopulation, MaleInfantMortalityFraction, MaleLifeExpectancy,
MaleLiteracyFraction, MaleMedianAge, MalePopulation, ManufacturingValueAdded,
```

```

MaritimeClaims, MedianAge, Memberships, MerchantShips, MerchantShipsDeadWeight,
MerchantShipsGross, MerchantShipTypes, MigrationRateFraction,
MilitaryAgeFemales, MilitaryAgeMales, MilitaryAgePopulation, MilitaryAgeRate,
MilitaryExpenditureFraction, MilitaryExpenditures, MilitaryFitFemales,
MilitaryFitMales, MilitaryFitPopulation, MiscellaneousValueAdded, Name,
NationalIncome, NationalityName, NativeName, NaturalGasConsumption,
NaturalGasExports, NaturalGasImports, NaturalGasProduction, NaturalGasReserves,
NaturalHazards, NaturalResources, OilConsumption, OilExports, OilImports,
OilProduction, OilReserves, PavedAirportLengths, PavedAirports, PavedRoadLength,
PhoneLines, Pipelines, Polygon, Population, PopulationGrowth, PovertyFraction,
PriceIndex, RadioStations, RailwayGaugeLengths, RailwayGaugeRules,
RailwayLength, RegionNames, Regions, Religions, ReligionsFractions,
RoadLength, SchematicCoordinates, SchematicPolygon, SectorLaborFractions,
Shape, ShortWaveRadioStations, SignedEnvironmentalAgreements, StandardName,
SuffrageType, TelevisionStations, TerrainTypes, TimeZones, TotalConsumption,
TotalFertilityRate, TradeValueAdded, TransportationValueAdded,
UNCode, UnemploymentFraction, UNNumber, UnpavedAirportLengths,
UnpavedAirports, UnpavedRoadLength, ValueAdded, WaterArea, WaterwayLength}

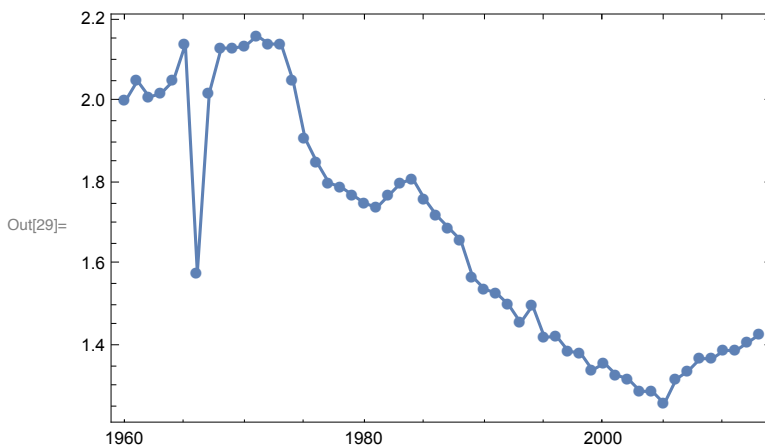
```

"Total fertility rate" TFR is the averaged number of children a woman has in her life. TFR has to be larger than 2 for a population to sustain itself. We will later learn about this fact in this course.

```
CountryData["Japan", "TotalFertilityRate"]
```

```
1.43 people/person
```

```
In[29]:= DateListPlot[CountryData["Japan", {"TotalFertilityRate", All}],
PlotMarkers -> Automatic]
```

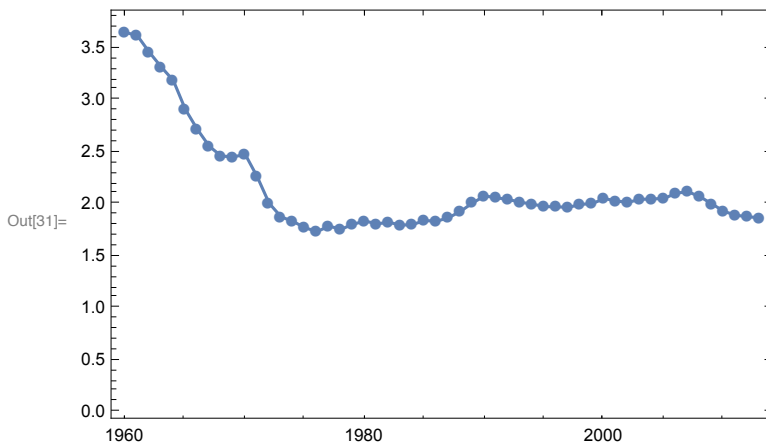


```
In[30]:= CountryData["USA", "TotalFertilityRate"]
```

```
Out[30]= 1.8695 people/person
```



```
In[31]:= DateListPlot[CountryData["USA", {"TotalFertilityRate", All}],
PlotMarkers -> Automatic]
```



```
In[32]:= CountryData["Japan", "LifeExpectancy"]
```

Out[32]= 83.58 yr

```
In[33]:= CountryData["USA", "LifeExpectancy"]
```

Out[33]= 78.941 yr

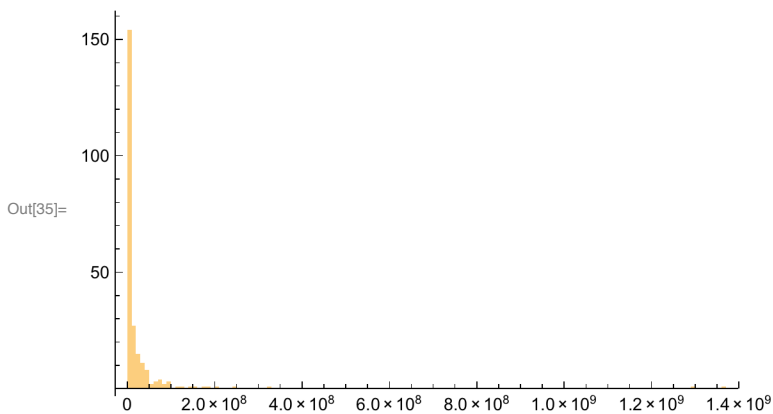
Distribution of the populations by country

Let's see which country has how many people.

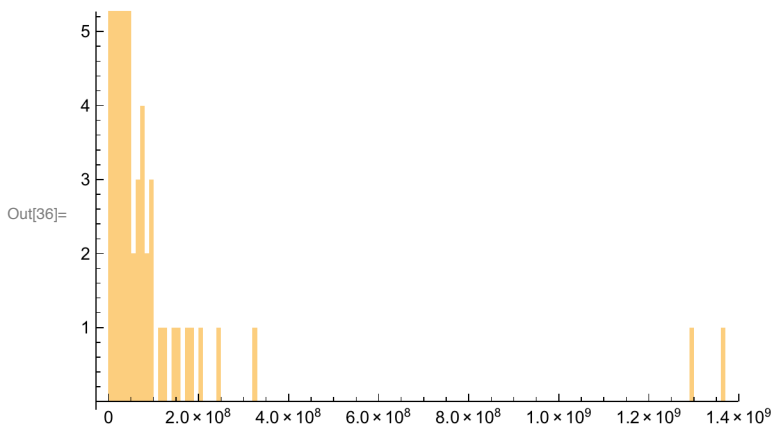
```
In[34]:= dataPopSizes = CountryData["Countries", "Population"];
```

Let's draw "histogram" of the populations of each country.

```
In[35]:= Histogram[dataPopSizes, PlotRange -> All]
```



```
In[36]:= Histogram[dataPopSizes, PlotRange -> {All, {0, 5}}]
```



China is top ranked and India is the next.

```
In[37]:= CountryData["China", "Population"]
```

```
Out[37]:= 1 364 773 138 people
```

```
In[38]:= CountryData["India", "Population"]
```

```
Out[38]:= 1 291 780 156 people
```

```
In[39]:= CountryData["USA", "Population"]
```

```
Out[39]:= 322 422 965 people
```

List the top ten countries in terms of the population size.

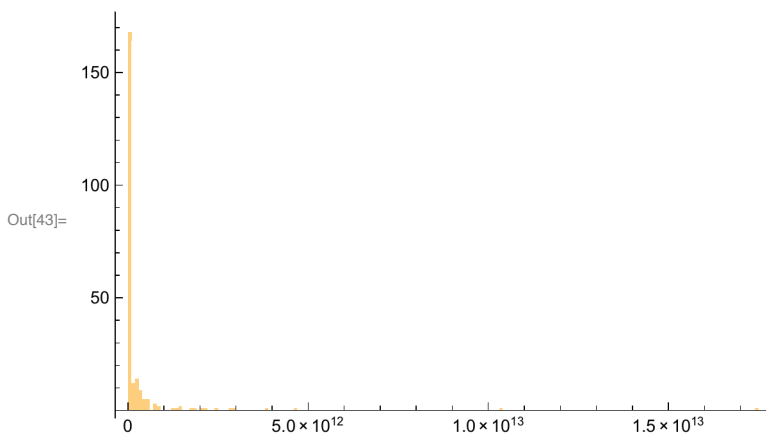
```
In[40]:= dataName = CountryData["Countries", "Name"];
Take[SortBy[Transpose[{dataName, dataPopSizes}], Last] // Reverse, 10]
```

```
Out[41]:= {{China, 1 364 773 138 people }, {India, 1 291 780 156 people },
{United States, 322 422 965 people }, {Indonesia, 249 563 467 people },
{Brazil, 201 700 544 people }, {Pakistan, 186 428 686 people },
{Nigeria, 175 288 238 people }, {Bangladesh, 156 380 192 people },
{Russia, 142 400 066 people }, {Japan, 126 225 259 people }}
```

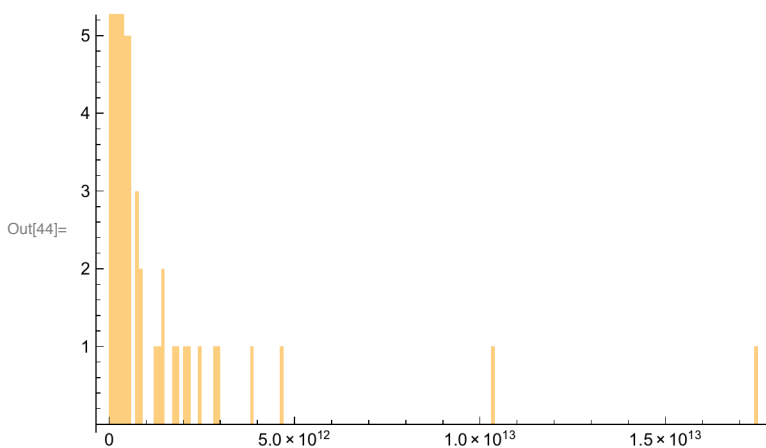
How about GDP?

```
In[42]:= dataGDP = CountryData["Countries", "GDP"];
```

In[43]:= **Histogram[dataGDP, PlotRange -> All]**



In[44]:= **Histogram[dataGDP, PlotRange -> {All, {0, 5}}]**



In[45]:= **dataName = CountryData["Countries", "Name"];
data = {dataName, dataGDP} // Transpose;**

In[47]:= **Take[SortBy[data, Last] // Reverse, 10]**

Out[47]= **{{United States, $\$1.7419 \times 10^{13}$ per year}, {China, $\$1.03548 \times 10^{13}$ per year},
{Japan, $\$4.60146 \times 10^{12}$ per year}, {Germany, $\$3.86829 \times 10^{12}$ per year},
{United Kingdom, $\$2.98889 \times 10^{12}$ per year}, {France, $\$2.82919 \times 10^{12}$ per year},
{Brazil, $\$2.41664 \times 10^{12}$ per year}, {Italy, $\$2.14116 \times 10^{12}$ per year},
{India, $\$2.04852 \times 10^{12}$ per year}, {Russia, $\$1.8606 \times 10^{12}$ per year}}**

Examples just for fun!

```
In[48]= CountryData["World", "Shape"]
```

```
Out[48]=
```



Which country is member of G7, Groupe of Seven?

```
In[49]= g7 = CountryData["G7"]
```

```
Out[49]= { Canada , France , Germany , Italy , Japan , United Kingdom , United States }
```

```
In[50]= CountryData[#, "Population"] & /@g7
```

```
Out[50]= { 35 309 555 people , 64 101 308 people , 81 625 599 people ,
          61 175 248 people , 126 225 259 people , 63 556 184 people , 322 422 965 people }
```

```
In[51]= CountryData[#, "GDP"] & /@g7
```

```
Out[51]= { $1.78539 × 1012 per year , $2.82919 × 1012 per year ,
          $3.86829 × 1012 per year , $2.14116 × 1012 per year ,
          $4.60146 × 1012 per year , $2.98889 × 1012 per year , $1.7419 × 1013 per year }
```

```
In[52]= CountryData[#, "PopulationGrowth"] & /@g7
```

```
Out[52]= { 0.00920091 people/ (person yr) ,
          0.00512445 people/ (person yr) , -0.00227597 people/ (person yr) ,
          0.00202168 people/ (person yr) , -0.000707227 people/ (person yr) ,
          0.0060401 people/ (person yr) , 0.00969061 people/ (person yr) }
```

```
In[53]= CountryData[#, "Area"] & /@g7
```

```
Out[53]= { 9.98467 × 106 km2 , 551 500. km2 , 357 022. km2 ,
          301 340. km2 , 377 835. km2 , 243 610. km2 , 9.63142 × 106 km2 }
```

Draw country flags in proportion to the population size

```
In[54]= cdata = CountryData["Countries", "Population"];
```

```
fdata = CountryData["Countries", "Flag"];
```

```
In[56]= list = Thread[ cdata → fdata];
```

```
In[57]:= th = Total[list[[All, 1]]] / 500;
```

```
In[58]:= list2 = Select[list, #[[1]] > th &];
```

```
In[59]:= ImageCollage[list2, ImagePadding → 2, Background → GrayLevel[.8], ImageSize → 500]
```



For other interesting examples about demography, visit URL :

[http://demonstrations.wolfram.com/topic.html?topic=Demography & limit=20](http://demonstrations.wolfram.com/topic.html?topic=Demography&limit=20)