Passage 24 A #2

The Worl Population

We have seen that the world pouplation has reached 7.3 billoion in 2015.

```
CountryData["World", "Population"]
```

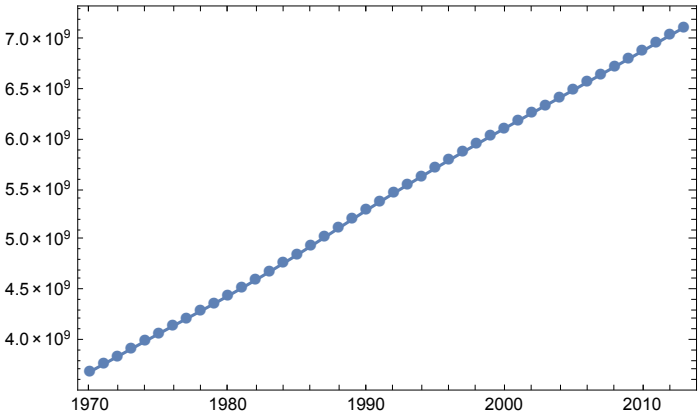
7.13001×10^9 people

We connect to a data base to retrieve various data.

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

TimeSeries [Time: 01 Jan 1970 to 01 Jan 2013
Data points: 44]

```
DateListPlot[data, PlotMarkers → Automatic]
```



Country by country population

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

```
CountryData["Japan", "Population"]
```

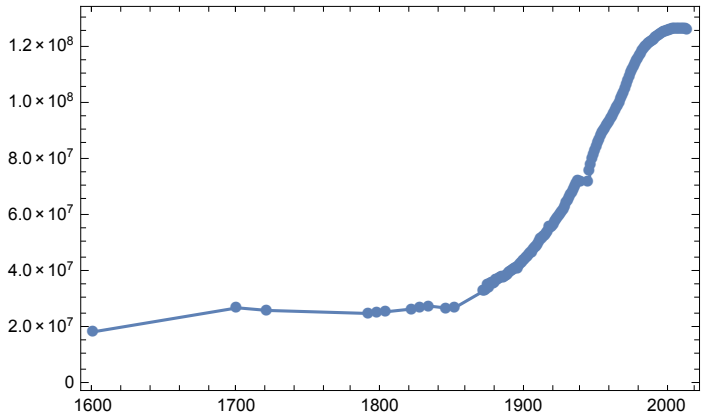
126 225 259 people

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

TimeSeries [Time: 01 Jan 1600 to 01 Jan 2014
Data points: 149]

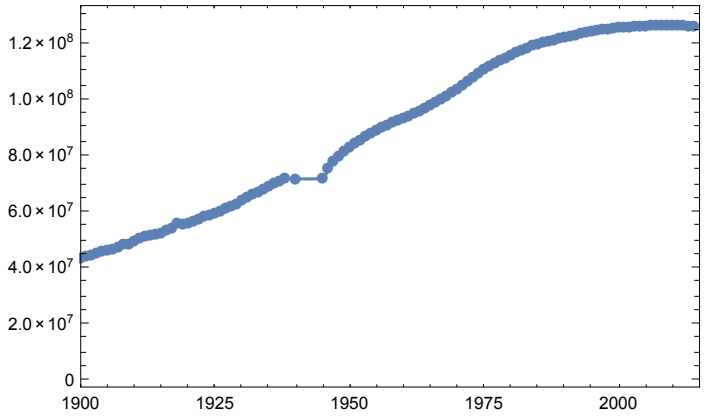
Data is available since 1600!

```
DateListPlot[dataJP, PlotMarkers → Automatic]
```

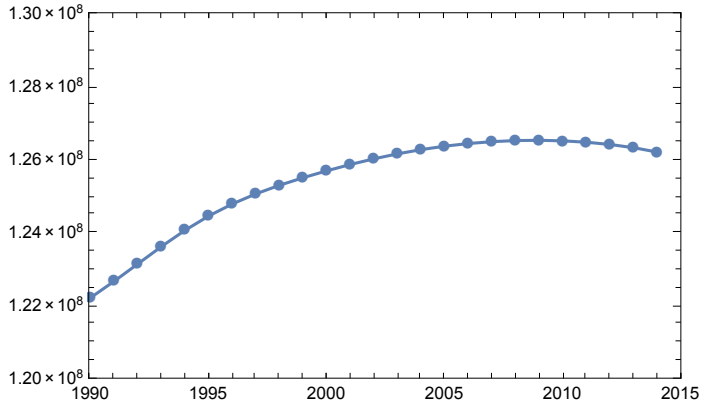


Some data are missing during the war. Japanese popualtion had been increasing every year after the war. But it has just started to decline.

```
DateListPlot[dataJP, PlotMarkers → Automatic,
 PlotRange → {{DateList["1900"], DateList["2015"]}, All}]
```




```
DateListPlot[dataJP, PlotMarkers → Automatic,
 PlotRange → {{DateList["1990"], DateList["2015"]}, {1.2 × 10^8, 1.3 × 10^8}}]
```



Let' s see the population of USA.

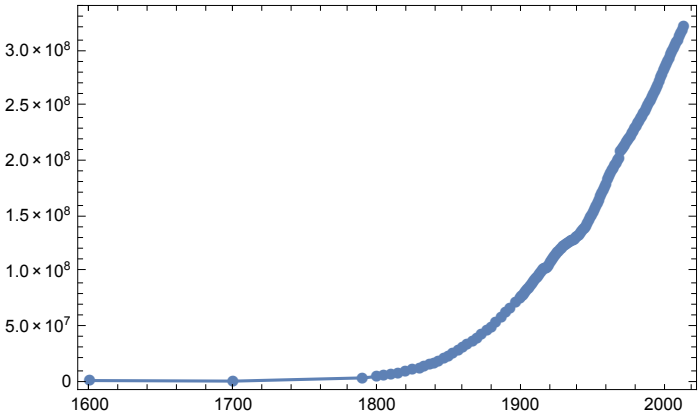
```
CountryData["USA", "Population"]
```

322 422 965 people

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

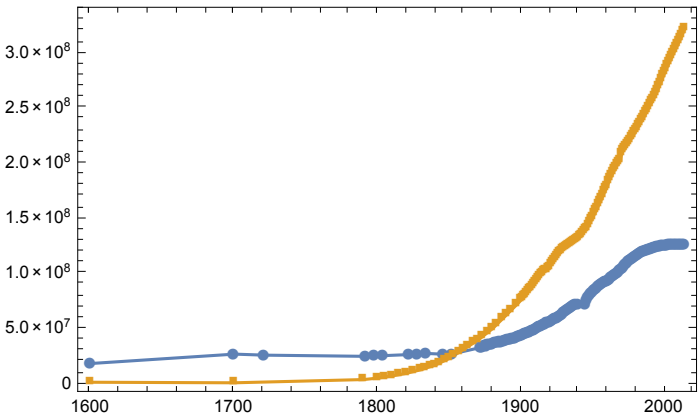
```
TimeSeries[ Time: 01 Jan 1600 to 01 Jan 2014
            Data points: 145 ]
```

```
DateListPlot[dataUSA, PlotMarkers → Automatic]
```



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

```
DateListPlot[{dataJP, dataUSA}, PlotMarkers → Automatic]
```



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

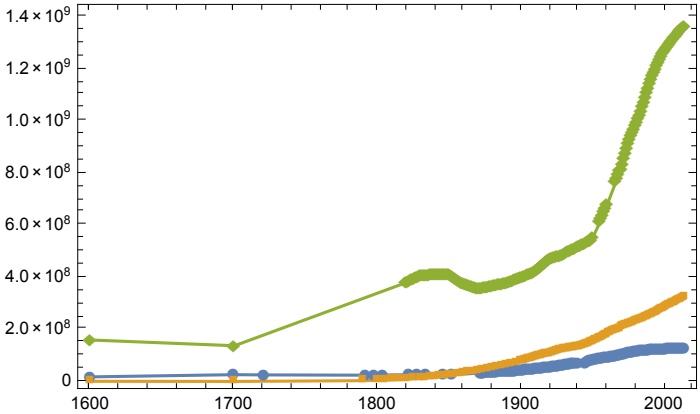
```
CountryData["China", "Population"]
```

```
1 364 773 138 people
```

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

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

```
DateListPlot[{dataJP, dataUSA, dataChina}, PlotMarkers → Automatic]
```



The database has various information about many countries.

```
CountryData["Countries"]
```

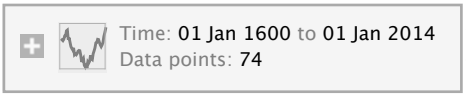
{ Afghanistan , Albania , Algeria , American Samoa , Andorra , Angola , Anguilla , Antigua and Barbuda , Argentina , Armenia , Aruba , Australia , Austria , Azerbaijan , Bahamas , Bahrain , Bangladesh , Barbados , Belarus , Belgium , Belize , Benin , Bermuda , Bhutan , Bolivia , Bosnia and Herzegovina , 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 }

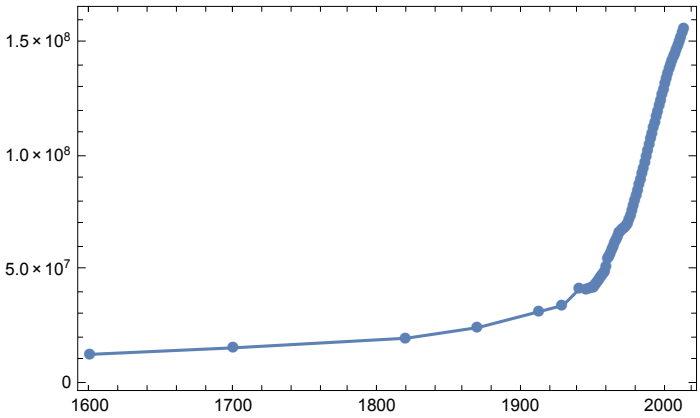
```
CountryData["Bangladesh", "Population"]
```

156 380 192 people

```
data = CountryData["Bangladesh", {"Population", All}]
```

TimeSeries []

```
DateListPlot[data, PlotMarkers → Automatic]
```

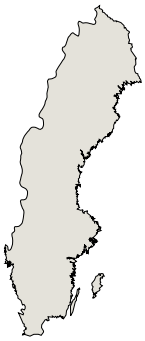



```
CountryData["Bangladesh", "Shape"]
```

```
CountryData["Sweden", "Population"]
```

9 595 619 people

```
CountryData["Sweden", "Shape"]
```



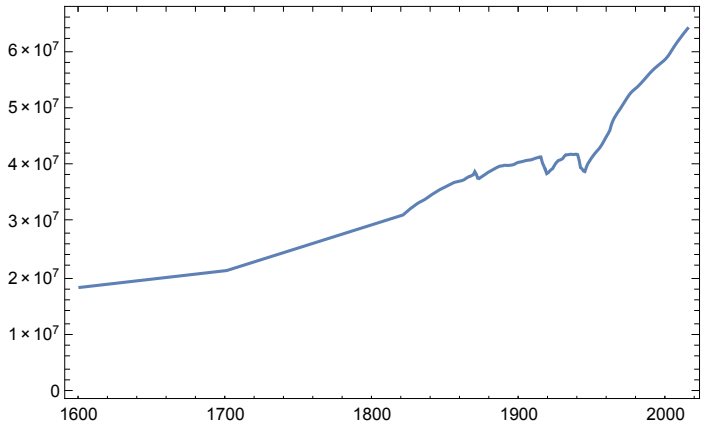
```
CountryData["Sweden", "LifeExpectancy"]
```

81.818 yr

```
CountryData["France", "Shape"]
```

In[1]:=
```
DateListPlot[CountryData["France", {"Population", All}]]
```

Out[1]=




```
CountryData["Properties"]
```

```
{AdultPopulation, AgriculturalProducts, AgriculturalValueAdded, Airports,
 AlternateNames, AlternateStandardNames, AMRadioStations, AnnualBirths,
 AnnualDeaths, AnnualHIVAIDSDeaths, 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, HIVAIDSDeathRateFraction, HIVAIDSFraction,
 HIVAIDSPopulation, 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,
```

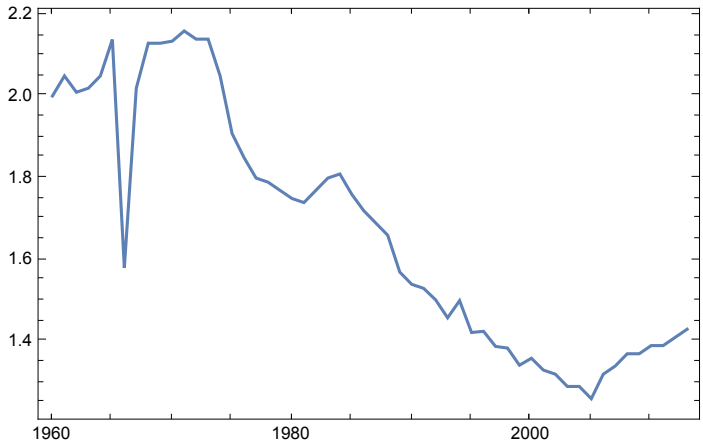
```
MaritimeClaims, MedianAge, Memberships, MerchantShips, MerchantShipsDeadWeight,
MerchantShipsGross, MerchantShipTypes, MigrationRateFraction,
MilitaryAgeFemales, MilitaryAgeMales, MilitaryAgePopulation, MilitaryAgeRate,
MilitaryExpenditureFraction, MilitaryExpenditures, MilitaryFitFemales,
MilitaryFitMales, 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
```

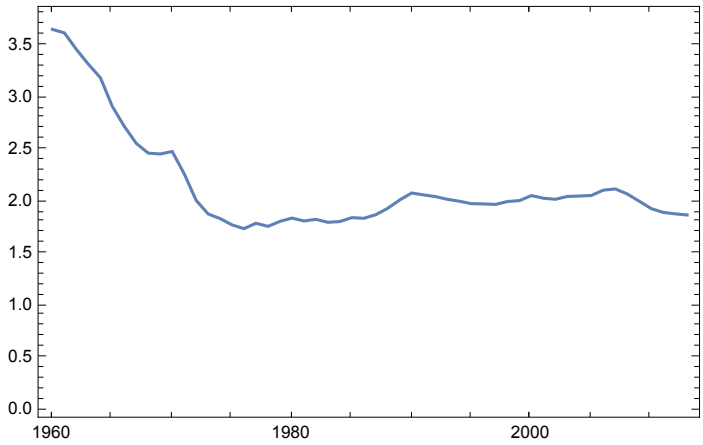
```
DateListPlot[CountryData["Japan", {"TotalFertilityRate", All}]]
```




```
CountryData["USA", "TotalFertilityRate"]
```

```
1.8695 people/person
```

```
DateListPlot[CountryData["USA", {"TotalFertilityRate", All}]]
```




```
CountryData["Japan", "LifeExpectancy"]
```

83.58 yr

```
CountryData["USA", "LifeExpectancy"]
```

78.941 yr

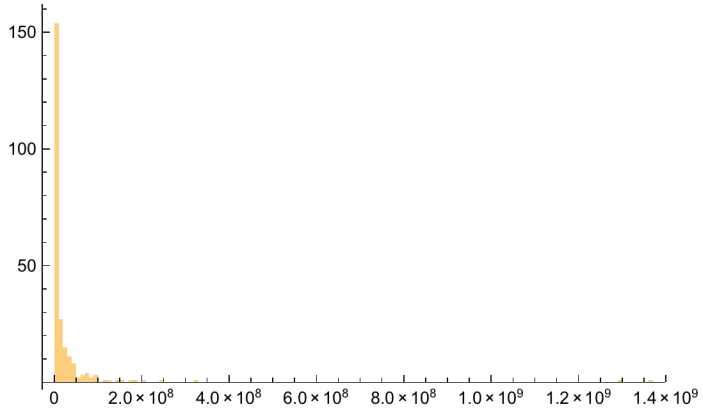
Distribution of the populations by country

Let' s see which country has how many people.

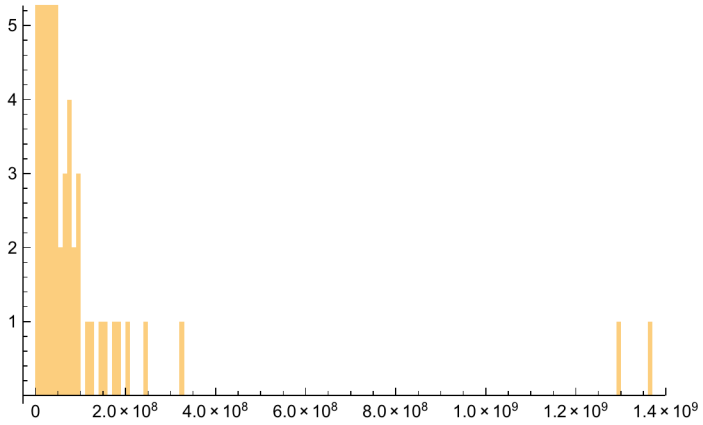
In[2]:=
```
dataPopSizes = CountryData["Countries", "Population"];
```

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

```
Histogram[dataPopSizes, PlotRange → All]
```



```
Histogram[dataPopSizes, PlotRange → {All, {0, 5}}]
```



China is top ranked and India is the next.

```
CountryData["China", "Population"]
```

1 364 773 138 people

```
CountryData["India", "Population"]
```

1 291 780 156 people

```
CountryData["USA", "Population"]
```

322 422 965 people

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

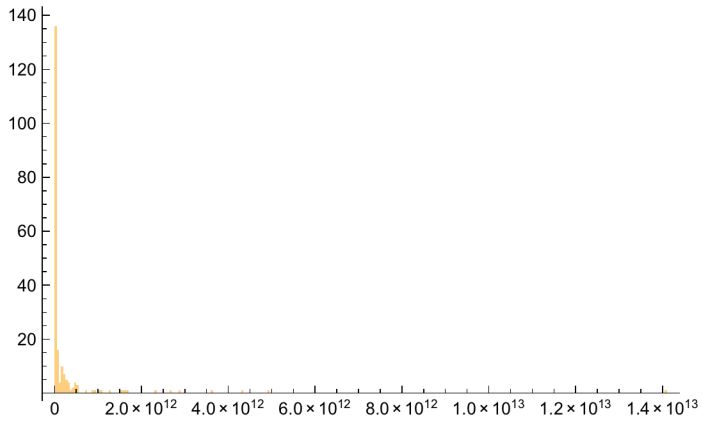
```
dataName = CountryData["Countries", "Name"];
Take[SortBy[Transpose[{dataName, dataPopSizes}], Last] // Reverse, 10]
```

```
{{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}}
```

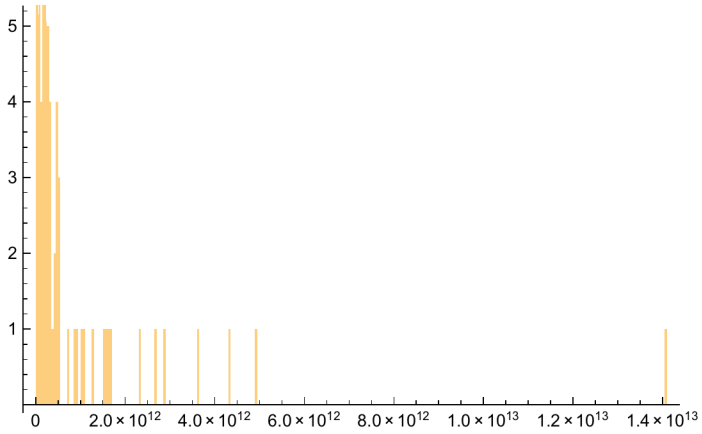
How about GDP?

```
dataGDP = CountryData["Countries", "GDP"];
```

```
Histogram[dataGDP, PlotRange → All]
```



```
Histogram[dataGDP, PlotRange → {All, {0, 5}}]
```




```
dataName = CountryData["Countries", "Name"];
data = {dataName, dataGDP} // Transpose;
```

```
Take[SortBy[data, Last] // Reverse, 10]
```

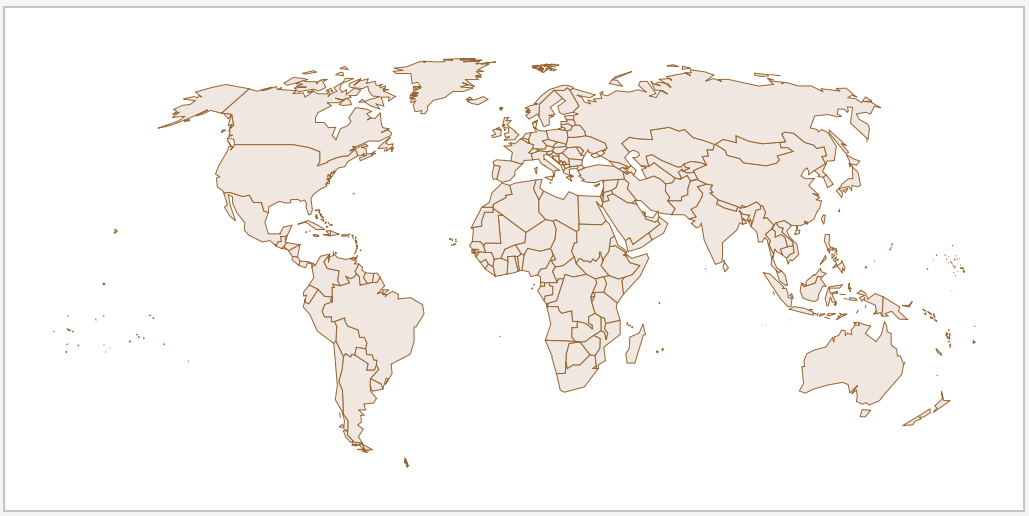
```
{{United States, $1.40967 × 10^13 per year}, {Japan, $4.91069 × 10^12 per year},
 {China, $4.32702 × 10^12 per year}, {Germany, $3.64947 × 10^12 per year},
 {France, $2.85653 × 10^12 per year}, {United Kingdom, $2.66627 × 10^12 per year},
 {Italy, $2.30306 × 10^12 per year}, {Russia, $1.67659 × 10^12 per year},
 {Spain, $1.60422 × 10^12 per year}, {Brazil, $1.5955 × 10^12 per year}}
```

Examples just for fun!

```
CountryData["World", "Shape"]
```

▶ 世界地図にプロット Bangladesh

country property Population



CanonicalName::noent : Bangladeshは実体タイプではありません. ≫

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CanonicalName::noent : Bangladeshは実体タイプではありません. ≫

CanonicalName::noent : Bangladeshは実体タイプではありません. ≫

Which country is member of G7, Groupe of Seven?

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

{Canada, France, Germany, Italy, Japan, United Kingdom, United States}

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

{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}

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

{1.5022×10^{12} per year, 2.85653×10^{12} per year,
3.64947×10^{12} per year, 2.30306×10^{12} per year,
4.91069×10^{12} per year, 2.66627×10^{12} per year, 1.40967×10^{13} per year}

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

```
{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)}
```

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

```
{9.98467 × 10^6 km^2, 551 500. km^2, 357 022. km^2,
 301 340. km^2, 377 835. km^2, 243 610. km^2, 9.63142 × 10^6 km^2}
```

Draw country flags in proportion to the population size

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

list = Thread[cdata → fdata];

th = Total[list[[All, 1]]] / 500;

list2 = Select[list, #[[1]] > th &];

ImageCollage[list2, ImagePadding → 2, Background → GrayLevel[.8], ImageSize → 500]
```