

Passage 24 A #1

■ Aim of this course

Understand the history of the world population.

Learn to describe how the world population changes using simple mathematics.

Study of human population is called "Demography". This course is also an introduction to human demography.

■ Why do we study demography?

■ The World Population now

The world population has reached 7.3 billion in 2015 and it is still increasing.

[http : // www.census.gov/popclock/world](http://www.census.gov/popclock/world)

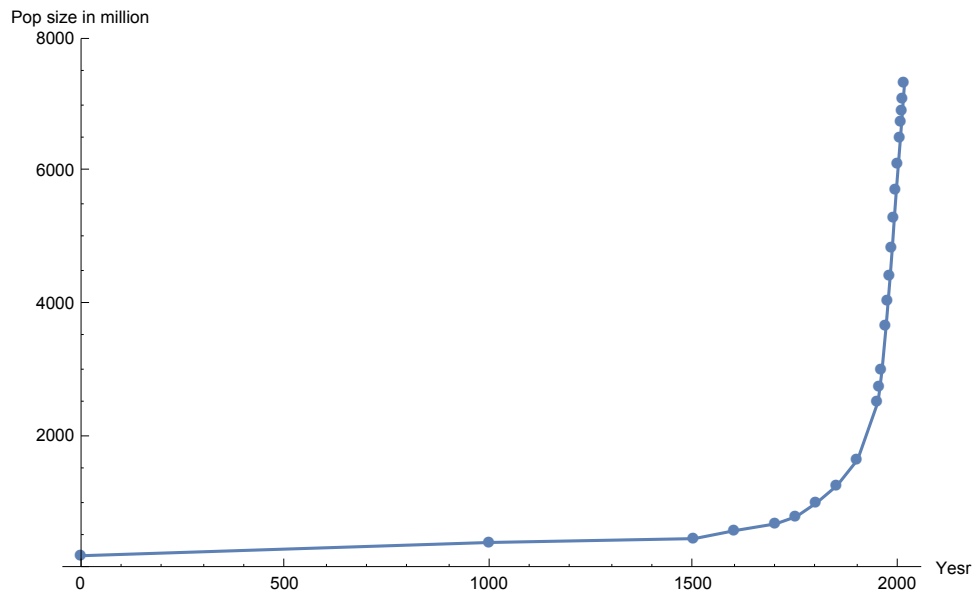
■ The World Population in the past

Since 2000 years ago

Data from Wikipedia "World population" (https://en.wikipedia.org/wiki/World_population). Population size is in million.

```
dataYearPopSize = {{0, 200}, {1000, 400}, {1500, 458}, {1600, 580},  
  {1700, 682}, {1750, 791}, {1800, 1000}, {1850, 1262}, {1900, 1650},  
  {1950, 2525}, {1955, 2758}, {1960, 3018}, {1970, 3682}, {1975, 4061},  
  {1980, 4440}, {1985, 4853}, {1990, 5310}, {1995, 5735}, {2000, 6127},  
  {2005, 6520}, {2008, 6764}, {2010, 6930}, {2012, 7097.5}, {2015, 7349}}  
  
{{0, 200}, {1000, 400}, {1500, 458}, {1600, 580}, {1700, 682},  
  {1750, 791}, {1800, 1000}, {1850, 1262}, {1900, 1650}, {1950, 2525},  
  {1955, 2758}, {1960, 3018}, {1970, 3682}, {1975, 4061}, {1980, 4440},  
  {1985, 4853}, {1990, 5310}, {1995, 5735}, {2000, 6127}, {2005, 6520},  
  {2008, 6764}, {2010, 6930}, {2012, 7097.5}, {2015, 7349}}
```

```
ListPlot[dataYearPopSize, Joined → True,
  PlotMarkers → Automatic, PlotRange → {0, 8000},
  AxesLabel → {"Year", "Pop size in million"}, ImageSize → 500]
```



Since 1950

Data from the US Census Bureau

(http://www.census.gov/population/international/data/worldpop/table_population.php).

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SetDirectory["/Volumes/OSX/Users/takasu/home/情報科学科の仕事/講義/平成28年度/H28
  パサージュ/Presentation/"]
```

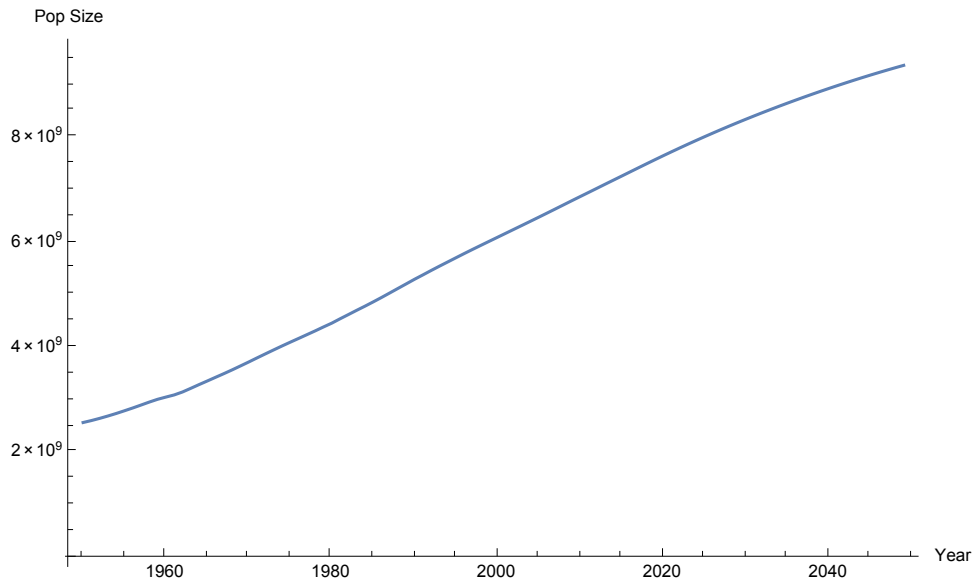
```
/Volumes/OSX/Users/takasu/home/情報科学科の仕事/講義/平成28年度/H28
  パサージュ/Presentation
```

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dataAll = ReadList["population_size-1950-2049.txt", {Real, Real, Real, Real}];
{dataYear, dataPopSize, dataAGRate, dataPopChange} = Transpose[dataAll];
dataYearPopSize = {dataYear, dataPopSize} // Transpose
{ {1950., 2.55763 × 109}, {1951., 2.59494 × 109},
  {1952., 2.63677 × 109}, {1953., 2.68205 × 109},
  {1954., 2.73023 × 109}, {1955., 2.7821 × 109}, {1956., 2.8353 × 109},
  {1957., 2.89135 × 109}, {1958., 2.94814 × 109}, {1959., 3.00072 × 109},
  {1960., 3.043 × 109}, {1961., 3.08397 × 109}, {1962., 3.14009 × 109},
  {1963., 3.20983 × 109}, {1964., 3.2812 × 109}, {1965., 3.35043 × 109},
  {1966., 3.42068 × 109}, {1967., 3.49033 × 109}, {1968., 3.56231 × 109},
  {1969., 3.63716 × 109}, {1970., 3.7127 × 109}, {1971., 3.79033 × 109},
  {1972., 3.86657 × 109}, {1973., 3.9421 × 109}, {1974., 4.01661 × 109},
  {1975., 4.08908 × 109}, {1976., 4.16019 × 109}, {1977., 4.23208 × 109},
  {1978., 4.30411 × 109}, {1979., 4.37901 × 109}, {1980., 4.45136 × 109},
  {1981., 4.53441 × 109}, {1982., 4.61457 × 109}, {1983., 4.69574 × 109},
  {1984., 4.77457 × 109}, {1985., 4.85646 × 109}, {1986., 4.94057 × 109},
  {1987., 5.0272 × 109}, {1988., 5.11456 × 109}, {1989., 5.20144 × 109},
  {1990., 5.28896 × 109}, {1991., 5.37159 × 109}, {1992., 5.45614 × 109},
  {1993., 5.53827 × 109}, {1994., 5.61868 × 109}, {1995., 5.6992 × 109},
  {1996., 5.77944 × 109}, {1997., 5.85797 × 109}, {1998., 5.93521 × 109},
  {1999., 6.01207 × 109}, {2000., 6.08857 × 109}, {2001., 6.16522 × 109},
  {2002., 6.24202 × 109}, {2003., 6.31859 × 109}, {2004., 6.3957 × 109},
  {2005., 6.47304 × 109}, {2006., 6.55126 × 109}, {2007., 6.62991 × 109},
  {2008., 6.70905 × 109}, {2009., 6.78821 × 109}, {2010., 6.86633 × 109},
  {2011., 6.94406 × 109}, {2012., 7.02235 × 109}, {2013., 7.10103 × 109},
  {2014., 7.17872 × 109}, {2015., 7.25649 × 109}, {2016., 7.33477 × 109},
  {2017., 7.41278 × 109}, {2018., 7.49043 × 109}, {2019., 7.5674 × 109},
  {2020., 7.6434 × 109}, {2021., 7.71826 × 109}, {2022., 7.79202 × 109},
  {2023., 7.86473 × 109}, {2024., 7.93627 × 109}, {2025., 8.00658 × 109},
  {2026., 8.07572 × 109}, {2027., 8.14373 × 109}, {2028., 8.21056 × 109},
  {2029., 8.27619 × 109}, {2030., 8.34061 × 109}, {2031., 8.40388 × 109},
  {2032., 8.46609 × 109}, {2033., 8.52725 × 109}, {2034., 8.58733 × 109},
  {2035., 8.6463 × 109}, {2036., 8.70424 × 109}, {2037., 8.76119 × 109},
  {2038., 8.81714 × 109}, {2039., 8.87207 × 109}, {2040., 8.92595 × 109},
  {2041., 8.97882 × 109}, {2042., 9.03072 × 109}, {2043., 9.08162 × 109},
  {2044., 9.13146 × 109}, {2045., 9.18023 × 109}, {2046., 9.22794 × 109},
  {2047., 9.27462 × 109}, {2048., 9.32023 × 109}, {2049., 9.36475 × 109}}

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```
ListPlot[dataYearPopSize, Joined → True,  
AxesLabel → {"Year", "Pop Size"}, ImageSize → 500]
```



■ Questions

- How did the world population change in the past?
- What is annual growth rate (%)?
- How will it change in future? How can we predict it?

■ Reference

How many people can the earth support? J E Cohen. 1995. W W Norton & Company, New York.
Population: An introduction to concepts and issues 8th edition. John R Weeks. 2002. Wadsworth Groups.
Lecture by Prof. J E Cohen at the Floating University: <http://www.floatinguniversity.com/lectures-cohen>