CISC1006: Probability and Statistics

Technology Assignment 1: From Data to Information

Search, Present and Analyze Data

(Percentage, Percentage Change and Annual Growth Rate)

Due: Feb. 24, 2021

Student Number DB927606 Name ZHANG HUAKANG / 张华康

Question 1

Give calculation steps with formula using the data in the file "MetaData China US"

(a) GDP per capita of US is ***$49471.27*** more than that of China in 2016 in absolute term.

```
=AB13-AB12

49471.27061
```

(b) GDP per capita of US is ***609.46%*** more than that of China in 2016 in relative term (in percentage change).

```
=(AB13-AB12)/AB12

6.09457195
```

(c) GDP growth rate of China is ***4.63%*** more than that of US in 2017 in absolute term.

```
=AC16-AC17

4.62666145169847
```

(d) GDP growth rate of China is ***203.52%*** more than that of US in 2017 in relative term (in percentage change).

```
=(AC16-AC17)/AC17

2.035183653
```

(e) State whether the following statement is true or false and explain why. If the statement is false, Find the true total growth rate over the three-year period using the given yearly growth rate.

"If the GDP in US grow by 2.57% in 2014, 2.86 % in 2015 and 1.49 % in 2016, then a total growth of 6.92 % over the three-year period. (by adding the three growth rate 2.57%+2.86 %+1.49 %=6.92%)."

False

$$GDP_{2013}(1+x)^3 = GDP_{2016}$$

$$1+x = \sqrt[3]{\frac{GDP_{2016}}{GDP_{2013}}}$$

$$x = \sqrt[3]{\frac{GDP_{2016}}{GDP_{2013}}} - 1$$

In Excel:

```
=POWER((AB2/Y2),1/3)-1
```

Result:

0.052180437

(f) What is the (average) annual growth rate of energy use per capita in China between 1993 and 2014. (correct to 2 decimal places)

$$P_{1993}(1+x)^{21} = P_{2014}$$

$$1+x = \sqrt[21]{\frac{P_{2014}}{P_{1993}}}$$

$$x = \sqrt[21]{\frac{P_{2014}}{P_{1993}}} - 1$$

In Excel:

```
=POWER(Z24/E24,1/21)-1
```

Result:

5.09%

(g) What is the (average) annual growth rate of energy use per capita in US between 1993 and 2014. (correct to 2 decimal places)

$$P_{1993}(1+x)^{21} = P_{2014}$$

$$1+x = \sqrt[21]{\frac{P_{2014}}{P_{1993}}}$$

$$x = \sqrt[21]{\frac{P_{2014}}{P_{1993}}} - 1$$

In Excel:

```
=POWER(Z25/E25,1/21)-1
```

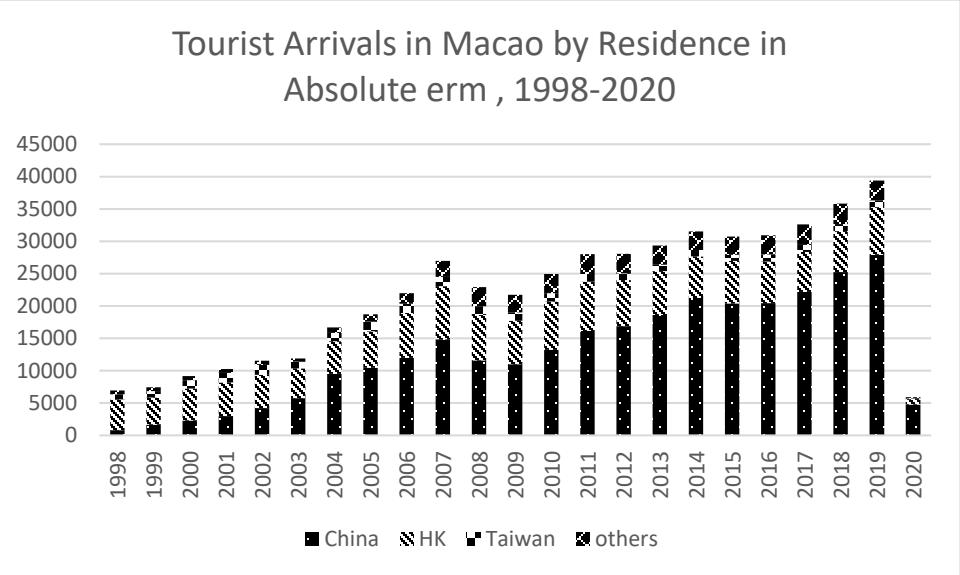
Result:

-0.49%

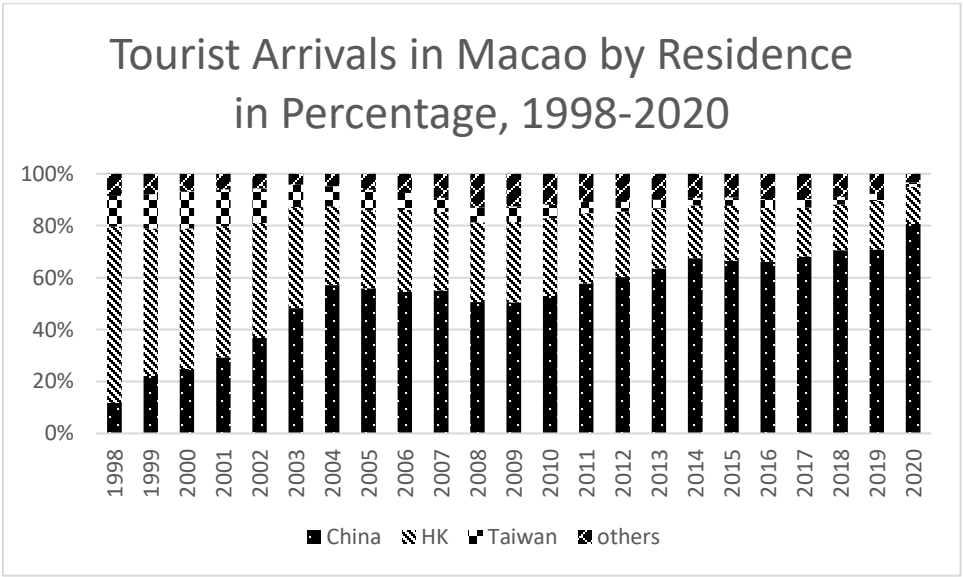
Question 2:

Given the data file "CISC1006 Tourist Arrivals in Macao by Residence 1998-2020",

(1) Present the data in a **Bar Chart** in total with its components over time **in absolute term**. (insert the chart here)



(2) Present the data in a **Bar Chart** in total with its components over time **in relative term** (in percentage). (insert chart here)



(3) Describe the **changes in the values** (correct to whole number percentage, e.g., 12%)

(a) The total tourist arrivals in Macao grow very fast at an average annual growth rate of ***8.61%*** from 1998 to 2019.

(b) Tourist arrivals from Mainland China has the highest average annual growth rate of ***18.31%***, compared to the tourist from HK, Taiwan and other countries with annual growth rate of ***2.13%*** , ***1.26%*** , ***8.14%*** respectively from 1998 to 2019.

(c) The tourist arrivals from mainland China have an average annual grow rate of ***10.39%*** after the individual travel scheme in 2003 (from 2003 to 2019)

(d) The total tourist arrivals in Macao increased by ***32458*** people in absolute term from 1998 to 2019, an increase of ***467%*** in relative term.

(4) Describe the **changes in percentages** (correct to whole number)

(a) Calculate the percentages of Tourists from Mainland, HK, and Taiwan in total from 1998 to 2019 in excel. (no answer is required here)

(b) The percentage of tourist arrivals from Mainland china has increased from ***11.76%*** in 1998 to ***70.86%*** in 2019, an increase of ***59.10 %*** in absolute term; or ***502%*** in relative term.

(c) The percentage of tourist arrivals from HK has decreased from ***67.95%*** in 1998 to ***18.66%*** in 2019, a decrease of ***49.29%*** in absolute term; or ***72.54%*** in relative term, even though the actual number of tourist arrivals from HK has increased by ***2632***people or increased by ***55.75%***.

(d) The percentage of tourist arrivals from Mainland China has an average annual increase rate of ***8.93%***.

(5) Calculate the yearly growth rate of total tourist arrivals from 1998 to 2020. (correct to whole number)

1998	1999	2000	2001	2002	2003	2004
#VALUE!	7.13%	23.08%	12.19%	12.18%	3.10%	40.25%

2005	2006	2007	2008	2009	2010	2011
12.23%	17.57%	22.71%	-15.04%	-5.15%	14.77%	12.16%

2012	2013	2014	2015	2016	2017	2018
0.29%	4.42%	7.51%	-2.57%	0.77%	5.37%	9.79%

2019	2020
10.06%	-85.04%

(a) Which are the years with two highest growth rate? Could you give the reasons briefly?

```
2004, because of the individual travel scheme.
```

(b) Which are the years with the lowest growth rate? Could you give the reasons briefly?

```
2019,  because of COVID-19.
```

Question 3: (Optional)

(a) Find the data for Macao's Gross domestic product (GDP) at current basic prices, by production approach from 1998 to 2019. Present the data in chart. Which production section contribute most to Macao's GDP? Upload your excel with the chart on UMMoodle.

(b) Find the original data in "Metadata China US" from World Bank, and download it in excel format;

Upload the original downloaded data on UMMoodle.