Task1.

(a)一开始先用安装时设置的管理员用户，进入并创建一个wangjing用户，并为他建立一个数据库testdb，并将权限赋予wangjing

```
[postgres=# create user wangjing with password '000000';
CREATE ROLE
[postgres=# create database testdb owner wangjing;
CREATE DATABASE
[postgres=# grant all privileges on database testdb to wangjing;
GRANT
```

(b)登陆wangjing用户，然后用建表命令建立一张名为US30的表，并规定各列的数据类型

```
[postgres=> \c testdb                                              ]
You are now connected to database "testdb" as user "wangjing".
[testdb=> CREATE TABLE US30(symbol char(20), price double precision, total_share ]
double precision, p_e_ratio double precision, market_value double precision, tot
al_profit double precision, PRIMARY KEY(symbol));
CREATE TABLE
[testdb=> \dt                                                      ]
        List of relations
 Schema | Name | Type  |  Owner
--------+------+-------+----------
 public | us30 | table | wangjing
(1 row)
```

(c)将数据导入，并通过market_value和total_profit的计算方法，用update命令来更新两列的数据

symbol	price	total_share	p_e_ratio	market_value	total_profit
MMM	219.52	597000000	27.68	131053440000	4734589595.37572
AXP	93.28	915000000	31.41	85351200000	2717325692.45463
AAPL	167.78	5082000000	18.22	852657960000	46797912184.4127
BA	327.88	596000000	24.41	195416480000	8005591151.16755
CAT	147.38	591000000	116.97	87101580000	744648884.329315
CVX	114.04	1899000000	23.51	216561960000	9211482773.28796
CSCO	42.89	4818000000	22.57	206644020000	9155694284.44838
KO	43.43	4264000000	149.76	185185520000	1236548611.11111
DWDP	63.71	2326000000	70.01	148189460000	2116689901.44265
XOM	74.61	4237000000	16.11	316122570000	19622754189.9441
GE	13.48	8846000000	11.52	119244080000	10351048611.1111
GS	251.86	398000000	27.95	100240280000	3586414311.27013
HD	178.24	1157000000	24.45	206223680000	8434506339.4683
IBM	153.43	966000000	24.99	148213380000	5930907563.02521
INTC	52.08	4680000000	26.17	243734400000	9313504012.22774
JNJ	128.15	2684000000	272.66	343954600000	1261478031.24771
JPM	109.97	3470000000	17.43	381595900000	21893052208.8353
MCD	156.38	797000000	24.55	124634860000	5076776374.74542
MRK	54.47	2696000000	62.61	146851120000	2345489857.85018
MSFT	91.27	7715000000	33.68	704148050000	20907008610.4513
NKE	66.44	1627000000	26.47	108097880000	4083788439.74311
PFE	35.49	5961000000	10.08	211555890000	20987687500
PG	79.28	2556000000	14.18	202639680000	14290527503.5261
TRV	138.86	284000000	18.94	39436240000	2082166842.66104
UNH	214	968000000	19.96	207152000000	10378356713.4269
UTX	125.82	823000000	22.07	103549860000	4691883099.22972
VZ	47.82	4150000000	6.5	198453000000	30531230769.2308
V	119.62	2061000000	20.31	246536820000	12138691285.0812
WMT	88.97	2987000000	20.31	265753390000	13084854258.9857
DIS	100.44	1510000000	17.65	151664400000	8592883852.69122

(30 rows)

Task2.

(a)通过order by命令，并设为ASC即降序排列方式，对market_value进行排序

```
testdb=> select * from us30 order by market_value;
     symbol      |  price  | total_share | p_e_ratio | market_value |   total_profit
-----------------+---------+-------------+-----------+--------------+-------------------
 TRV             |  138.86 |   284000000 |     18.94 |  39436240000 |  2082166842.66104
 AXP             |   93.28 |   915000000 |     31.41 |  85351200000 |  2717325692.45463
 CAT             |  147.38 |   591000000 |    116.97 |  87101580000 |  744648884.329315
 GS              |  251.86 |   398000000 |     27.95 | 100240280000 |  3586414311.27013
 UTX             |  125.82 |   823000000 |     22.07 | 103549860000 |  4691883099.22972
 NKE             |   66.44 |  1627000000 |     26.47 | 108097880000 |  4083788439.74311
 GE              |   13.48 |  8846000000 |     11.52 | 119244080000 |  10351048611.1111
 MCD             |  156.38 |   797000000 |     24.55 | 124634860000 |  5076776374.74542
 MMM             |  219.52 |   597000000 |     27.68 | 131053440000 |  4734589595.37572
 MRK             |   54.47 |  2696000000 |     62.61 | 146851120000 |  2345489857.85018
 DWDP            |   63.71 |  2326000000 |     70.01 | 148189460000 |  2116689901.44265
 IBM             |  153.43 |   966000000 |     24.99 | 148213380000 |  5930907563.02521
 DIS             |  100.44 |  1510000000 |     17.65 | 151664400000 |  8592883852.69122
 KO              |   43.43 |  4264000000 |    149.76 | 185185520000 |  1236548611.11111
 BA              |  327.88 |   596000000 |     24.41 | 195416480000 |  8005591151.16755
 VZ              |   47.82 |  4150000000 |       6.5 | 198453000000 |  30531230769.2308
 PG              |   79.28 |  2556000000 |     14.18 | 202639680000 |  14290527503.5261
 HD              |  178.24 |  1157000000 |     24.45 | 206223680000 |   8434506339.4683
 CSCO            |   42.89 |  4818000000 |     22.57 | 206644020000 |  9155694284.44838
 UNH             |     214 |   968000000 |     19.96 | 207152000000 |  10378356713.4269
 PFE             |   35.49 |  5961000000 |     10.08 | 211555890000 |        20987687500
 CVX             |  114.04 |  1899000000 |     23.51 | 216561960000 |  9211482773.28796
 INTC            |   52.08 |  4680000000 |     26.17 | 243734400000 |  9313504012.22774
 V               |  119.62 |  2061000000 |     20.31 | 246536820000 |  12138691285.0812
 WMT             |   88.97 |  2987000000 |     20.31 | 265753390000 |  13084854258.9857
 XOM             |   74.61 |  4237000000 |     16.11 | 316122570000 |  19622754189.9441
 JNJ             |  128.15 |  2684000000 |    272.66 | 343954600000 |  1261478031.24771
 JPM             |  109.97 |  3470000000 |     17.43 | 381595900000 |  21893052208.8353
 MSFT            |   91.27 |  7715000000 |     33.68 | 704148050000 |  20907008610.4513
 AAPL            |  167.78 |  5082000000 |     18.22 | 852657960000 |  46797912184.4127
(30 rows)

testdb=>
```

(b)通过order by命令，并设为DESC即降序排列方式，对total_profit进行排序

```
testdb=> SELECT * FROM US30 ORDER BY total_profit DESC;
     symbol      |  price  | total_share | p_e_ratio | market_value |   total_profit
-----------------+---------+-------------+-----------+--------------+-------------------
 AAPL            |  167.78 |  5082000000 |     18.22 | 852657960000 |  46797912184.4127
 VZ              |   47.82 |  4150000000 |       6.5 | 198453000000 |  30531230769.2308
 JPM             |  109.97 |  3470000000 |     17.43 | 381595900000 |  21893052208.8353
 PFE             |   35.49 |  5961000000 |     10.08 | 211555890000 |        20987687500
 MSFT            |   91.27 |  7715000000 |     33.68 | 704148050000 |  20907008610.4513
 XOM             |   74.61 |  4237000000 |     16.11 | 316122570000 |  19622754189.9441
 PG              |   79.28 |  2556000000 |     14.18 | 202639680000 |  14290527503.5261
 WMT             |   88.97 |  2987000000 |     20.31 | 265753390000 |  13084854258.9857
 V               |  119.62 |  2061000000 |     20.31 | 246536820000 |  12138691285.0812
 UNH             |     214 |   968000000 |     19.96 | 207152000000 |  10378356713.4269
 GE              |   13.48 |  8846000000 |     11.52 | 119244080000 |  10351048611.1111
 INTC            |   52.08 |  4680000000 |     26.17 | 243734400000 |  9313504012.22774
 CVX             |  114.04 |  1899000000 |     23.51 | 216561960000 |  9211482773.28796
 CSCO            |   42.89 |  4818000000 |     22.57 | 206644020000 |  9155694284.44838
 DIS             |  100.44 |  1510000000 |     17.65 | 151664400000 |  8592883852.69122
 HD              |  178.24 |  1157000000 |     24.45 | 206223680000 |   8434506339.4683
 BA              |  327.88 |   596000000 |     24.41 | 195416480000 |  8005591151.16755
 IBM             |  153.43 |   966000000 |     24.99 | 148213380000 |  5930907563.02521
 MCD             |  156.38 |   797000000 |     24.55 | 124634860000 |  5076776374.74542
 MMM             |  219.52 |   597000000 |     27.68 | 131053440000 |  4734589595.37572
 UTX             |  125.82 |   823000000 |     22.07 | 103549860000 |  4691883099.22972
 NKE             |   66.44 |  1627000000 |     26.47 | 108097880000 |  4083788439.74311
 GS              |  251.86 |   398000000 |     27.95 | 100240280000 |  3586414311.27013
 AXP             |   93.28 |   915000000 |     31.41 |  85351200000 |  2717325692.45463
 MRK             |   54.47 |  2696000000 |     62.61 | 146851120000 |  2345489857.85018
 DWDP            |   63.71 |  2326000000 |     70.01 | 148189460000 |  2116689901.44265
 TRV             |  138.86 |   284000000 |     18.94 |  39436240000 |  2082166842.66104
 JNJ             |  128.15 |  2684000000 |    272.66 | 343954600000 |  1261478031.24771
 KO              |   43.43 |  4264000000 |    149.76 | 185185520000 |  1236548611.11111
 CAT             |  147.38 |   591000000 |    116.97 |  87101580000 |  744648884.329315
```

(c)通过order by和limit命令，获得p_e_ratio最高的三个数据项

```
testdb=> SELECT * FROM US30 ORDER BY p_e_ratio DESC LIMIT 3;
     symbol      |  price  | total_share | p_e_ratio | market_value |   total_profit
-----------------+---------+-------------+-----------+--------------+-------------------
 JNJ             |  128.15 |  2684000000 |    272.66 | 343954600000 |  1261478031.24771
 KO              |   43.43 |  4264000000 |    149.76 | 185185520000 |  1236548611.11111
 CAT             |  147.38 |   591000000 |    116.97 |  87101580000 |  744648884.329315
(3 rows)
```

Task3.

(a)通过sum()函数，获得所有数据项的price的和，然后除以dow divisor

```
testdb=> SELECT SUM(price) FROM US30;
   sum
---------
 3500.59
(1 row)
```

3500.59/0.145235 = 24102.9366199608

(b)建立一个名为DJIA(args)的函数，参数为输入dow divisor，然后可以返回道琼斯工业平均指数

```
testdb=> CREATE FUNCTION DJIA(dow double precision)
testdb-> RETURNS double precision AS $djia$
testdb$> declare
testdb$>  djia double precision;
testdb$> BEGIN
testdb$>  SELECT SUM(price)/dow INTO djia FROM US30;
testdb$>  RETURN djia;
testdb$> END;
testdb$> $djia$ LANGUAGE plpgsql;
CREATE FUNCTION
testdb=> select DJIA(0.145235);
      djia
------------------
 24102.9366199608
(1 row)
```

(c)将MSFT换成GOOG，并从网上获得数据，并输入。然后调用DJIA函数

```
      symbol  |  price  | total_share | p_e_ratio | market_value |  total_profit
-------------+---------+-------------+-----------+--------------+-----------------
 GOOG        | 1037.14 |   687000000 |     56.95 | 712515180000 | 12511241088.6743
 MMM         |  219.52 |   597000000 |     27.68 | 131053440000 | 4734589595.37572
 AXP         |   93.28 |   915000000 |     31.41 |  85351200000 | 2717325692.45463
 AAPL        |  167.78 |  5082000000 |     18.22 | 852657960000 | 46797912184.4127
 BA          |  327.88 |   596000000 |     24.41 | 195416480000 | 8005591151.16755
 CAT         |  147.38 |   591000000 |    116.97 |  87101580000 | 744648884.329315
 CVX         |  114.04 |  1899000000 |     23.51 | 216561960000 | 9211482773.28796
 CSCO        |   42.89 |  4818000000 |     22.57 | 206644020000 | 9155694284.44838
 KO          |   43.43 |  4264000000 |    149.76 | 185185520000 | 1236548611.11111
 DWDP        |   63.71 |  2326000000 |     70.01 | 148189460000 | 2116689901.44265
 XOM         |   74.61 |  4237000000 |     16.11 | 316122570000 | 19622754189.9441
 GE          |   13.48 |  8846000000 |     11.52 | 119244080000 | 10351048611.1111
 GS          |  251.86 |   398000000 |     27.95 | 100240280000 | 3586414311.27013
 HD          |  178.24 |  1157000000 |     24.45 | 206223680000 |  8434506339.4683
 IBM         |  153.43 |   966000000 |     24.99 | 148213380000 | 5930907563.02521
 INTC        |   52.08 |  4680000000 |     26.17 | 243734400000 | 9313504012.22774
 JNJ         |  128.15 |  2684000000 |    272.66 | 343954600000 | 1261478031.24771
 JPM         |  109.97 |  3470000000 |     17.43 | 381595900000 | 21893052208.8353
 MCD         |  156.38 |   797000000 |     24.55 | 124634860000 | 5076776374.74542
 MRK         |   54.47 |  2696000000 |     62.61 | 146851120000 | 2345489857.85018
 NKE         |   66.44 |  1627000000 |     26.47 | 108097880000 | 4083788439.74311
 PFE         |   35.49 |  5961000000 |     10.08 | 211555890000 |       20987687500
 PG          |   79.28 |  2556000000 |     14.18 | 202639680000 | 1429052750.5261
 TRV         |  138.86 |   284000000 |     18.94 |  39436240000 | 2082166842.66104
 UNH         |     214 |   968000000 |     19.96 | 207152000000 | 10378356713.4269
 UTX         |  125.82 |   823000000 |     22.07 | 103549860000 | 4691883099.22972
 VZ          |   47.82 |  4150000000 |       6.5 | 198453000000 | 30531230769.2308
 V           |  119.62 |  2061000000 |     20.31 | 246536820000 | 12138691285.0812
 WMT         |   88.97 |  2987000000 |     20.31 | 265753390000 | 13084854258.9857
 DIS         |  100.44 |  1510000000 |     17.65 | 151664400000 | 8592883852.69122
(30 rows)

testdb=> SELECT DJIA(0.145235);
      djia
------------------
 30615.6229558991
(1 row)
```

Task4.

我认为，会出现熊市。因为很明显地可以发现，最后一阶段的k线出现了连续的下滑，而且和之前的有起伏地增长，然后稳定的增长相比，中间有个很明显的转折，可以说非常剧烈了。而且2017年初开始，一直在高速稳定地增长，这其中有可能存在严重的泡沫，近期泡沫破裂，而且近期由于中美之间的贸易战影响，已经特朗普的一系列措施，导致美国股市受到负面影响，可能出现熊市。而且相比于以往，近期的波动也特别大，说明股市极其不稳定。