```
Python 3.11.7 | packaged by Anaconda, Inc. | (main, Dec 15 2023, 18:05:47) [MSC v.1916 64
bit (AMD64)]
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IPython 8.20.0 -- An enhanced Interactive Python.

In [1]: import        as

In [2]: import          as

In [3]:                    =   .            "C:/Users/andie/OneDrive/Documents/Capstone/
Mail_v2/Piece Output v2/Originating Pieces pt.1 v2.csv"

In [4]:                    =   .            "C:/Users/andie/OneDrive/Documents/Capstone/
Mail_v2/Piece Output v2/Originating Pieces pt.2 v2.csv"

In [5]:           =                               'ACTUAL_DLVRY_DATE'   >
"2024-01-08"  &                        'ACTUAL_DLVRY_DATE'   < "2024-01-21"

In [6]:           =                               'ACTUAL_DLVRY_DATE'   >
"2024-01-08"  &                        'ACTUAL_DLVRY_DATE'   < "2024-01-21"

In [7]:           =           .            ='any'      =0

In [8]:          =           .

In [9]:            =            .            ='any'      =0

In [10]:           =          .

In [11]:        'OnTimeExactly'  =   .            'ACTUAL_DLVRY_DATE'   ==
        'EXPECTED_DELIVERY_DATE'    True   False
   ...:         'Early'  =   .               'ACTUAL_DLVRY_DATE'   <
        'EXPECTED_DELIVERY_DATE'    True   False
   ...:         'Late'  =   .               'ACTUAL_DLVRY_DATE'   >
        'EXPECTED_DELIVERY_DATE'    True   False

In [12]:        'OnTimeExactly'  =   .            'ACTUAL_DLVRY_DATE'   ==
        'EXPECTED_DELIVERY_DATE'    True   False
   ...:         'Early'  =   .               'ACTUAL_DLVRY_DATE'   <
        'EXPECTED_DELIVERY_DATE'    True   False
   ...:         'Late'  =   .               'ACTUAL_DLVRY_DATE'   >
        'EXPECTED_DELIVERY_DATE'    True   False

In [13]:                              =   .

In [14]:                 =                          'Late' .      .

In [15]:                  =                         'Early' .      .

In [16]:                  =                       'OnTimeExactly' .      .

In [17]: print "Late mail: "+ str              + ", Early Mail: "+
str                +", On Time Mail: "+ str
Late mail: 2755583, Early Mail: 17054971, On Time Mail: 8634603

In [18]:                      =                  /                +
```

```
In [19]: print "Ratio of Late Mail vs. Early or On Time mail: " + str "%f" %

Ratio of Late Mail vs. Early or On Time mail: 0.107265

In [20]:              =                              .              = "MAIL_SHAPE"   "Late"   .
# True = Late, False = either Early or On Time Exactly

In [21]: print
MAIL_SHAPE   Late
Card         False      172241
             True       102410
Flat         False     2235735
             True       141223
Letter       False    23281598
             True      2511950
dtype: int64

In [22]:                                      'MAIL_SHAPE' .
Out[22]:
MAIL_SHAPE
Letter     25793548
Flat        2376958
Card         274651
Name: count, dtype: int64

In [23]:                                      'MAIL_CLASS' .
Out[23]:
MAIL_CLASS
USPS Marketing Mail        17134116
First Class Presort         6163077
Single Piece First Class    4599518
Periodicals                  548446
Name: count, dtype: int64

In [24]:              =                              .           = "MAIL_CLASS"   "Late"   .
# True = Late, False = either Early or On Time Exactly

In [25]: print
MAIL_CLASS                 Late
First Class Presort        False      5190341
                           True        972736
Periodicals                False       521124
                           True         27322
Single Piece First Class   False      3788133
                           True        811385
USPS Marketing Mail        False     16189976
                           True        944140
dtype: int64

In [26]:                              'EXPECTED_DESTINATION_FACILITY' .
Out[26]:
EXPECTED_DESTINATION_FACILITY
NASHVILLE - 1441275              12030213
MEMPHIS - 1441274                 6331778
MUSIC CITY ANNEX - 1532174        1637834
BATON ROUGE - 1441379             1292325
NEW ORLEANS - 1441382             1139644
                                      ...
FAYETTEVILLE NC ANNEX - 1440967        766
```

```
JT WEEKER ISC - 1451865              646
CHEYENNE - 1441142                   577
FOX VALLEY - 1441104                 551
FARGO ASF - 1479956                  331
Name: count, Length: 182, dtype: int64
```

In [27]:   =   .   = "MAIL_CLASS" "Late"   .
True = Late, False = either Early or On Time Exactly

In [28]: print
```
MAIL_CLASS                 Late
First Class Presort        False    5190341
                           True      972736
Periodicals                False     521124
                           True       27322
Single Piece First Class   False    3788133
                           True      811385
USPS Marketing Mail        False   16189976
                           True      944140
dtype: int64
```

In [29]:   'EXPECTED_DESTINATION_FACILITY' .
Out[29]:
```
EXPECTED_DESTINATION_FACILITY
NASHVILLE - 1441275             12030213
MEMPHIS - 1441274                6331778
MUSIC CITY ANNEX - 1532174       1637834
BATON ROUGE - 1441379            1292325
NEW ORLEANS - 1441382            1139644
                                    ...
FAYETTEVILLE NC ANNEX - 1440967      766
JT WEEKER ISC - 1451865              646
CHEYENNE - 1441142                   577
FOX VALLEY - 1441104                 551
FARGO ASF - 1479956                  331
Name: count, Length: 182, dtype: int64
```

In [30]:   =
                         .   = "EXPECTED_DESTINATION_FACILITY" "Late" .   #
True = Late, False = either Early or On Time Exactly

In [31]: print
```
EXPECTED_DESTINATION_FACILITY  Late
ABILENE - 1441176              False    10069
                               True       484
AKRON - 1441254                False     4751
                               True       679
ALBANY - 1441026               False     5146
                                 ...
WICHITA - 1441162              True      2463
WILMINGTON - 1441060           False     6405
                               True      6119
YAKIMA - 1441462               False      586
                               True       227
Length: 364, dtype: int64
```

In [32]:   'ORIGIN_FACILITY' .
Out[32]:
```
ORIGIN_FACILITY
```

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NASHVILLE - 1441275          13046409
MEMPHIS NDC - 1372672         7163871
MEMPHIS - 1441274             6071953
MUSIC CITY ANNEX - 1532174    2162924
Name: count, dtype: int64
```

In [33]:   =   .   = "ORIGIN_FACILITY"
"Late"   .   # True = Late, False = either Early or On Time Exactly

In [34]:   =   .   = "ORIGIN_FACILITY"
"Late"   .   # True = Late, False = either Early or On Time Exactly

In [35]: print
```
ORIGIN_FACILITY               Late
MEMPHIS - 1441274             False     4807851
                              True      1264102
MEMPHIS NDC - 1372672         False     6520111
                              True       643760
MUSIC CITY ANNEX - 1532174    False     2053387
                              True       109537
NASHVILLE - 1441275           False    12308225
                              True       738184

dtype: int64
```

In [36]:   'Difference' =
                                   'ACTUAL_DLVRY_DATE'   -
                                   'EXPECTED_DELIVERY_DATE Date' . .
```
Traceback (most recent call last):

  File ~\anaconda3\Lib\site-packages\pandas\core\indexes\base.py:3791 in get_loc
    return self._engine.get_loc(casted_key)

  File index.pyx:152 in pandas._libs.index.IndexEngine.get_loc

  File index.pyx:181 in pandas._libs.index.IndexEngine.get_loc

  File pandas\_libs\hashtable_class_helper.pxi:7080 in
pandas._libs.hashtable.PyObjectHashTable.get_item

  File pandas\_libs\hashtable_class_helper.pxi:7088 in
pandas._libs.hashtable.PyObjectHashTable.get_item

KeyError: 'EXPECTED_DELIVERY_DATE Date'


The above exception was the direct cause of the following exception:

Traceback (most recent call last):

  Cell In[36], line 1
    originatingPieces_stormPeriod['Difference'] =
(originatingPieces_stormPeriod['ACTUAL_DLVRY_DATE'] -
originatingPieces_stormPeriod['EXPECTED_DELIVERY_DATE Date']).dt.days

  File ~\anaconda3\Lib\site-packages\pandas\core\frame.py:3893 in __getitem__
    indexer = self.columns.get_loc(key)

  File ~\anaconda3\Lib\site-packages\pandas\core\indexes\base.py:3798 in get_loc
    raise KeyError(key) from err
```

KeyError: 'EXPECTED_DELIVERY_DATE Date'

In [37]:   'Difference' =
                                       'ACTUAL_DLVRY_DATE'   -
                                       'EXPECTED_DELIVERY_DATE' .   .
Traceback (most recent call last):

  File ~\anaconda3\Lib\site-packages\pandas\core\ops\array_ops.py:220 in _na_arithmetic_op
    result = func(left, right)

  File ~\anaconda3\Lib\site-packages\pandas\core\computation\expressions.py:242 in evaluate
    return _evaluate(op, op_str, a, b) # type: ignore[misc]

  File ~\anaconda3\Lib\site-packages\pandas\core\computation\expressions.py:131 in
_evaluate_numexpr
    result = _evaluate_standard(op, op_str, a, b)

  File ~\anaconda3\Lib\site-packages\pandas\core\computation\expressions.py:73 in
_evaluate_standard
    return op(a, b)

TypeError: unsupported operand type(s) for -: 'str' and 'str'

During handling of the above exception, another exception occurred:

Traceback (most recent call last):

  Cell In[37], line 1
    originatingPieces_stormPeriod['Difference'] =
(originatingPieces_stormPeriod['ACTUAL_DLVRY_DATE'] -
originatingPieces_stormPeriod['EXPECTED_DELIVERY_DATE']).dt.days

  File ~\anaconda3\Lib\site-packages\pandas\core\ops\common.py:76 in new_method
    return method(self, other)

  File ~\anaconda3\Lib\site-packages\pandas\core\arraylike.py:194 in __sub__
    return self._arith_method(other, operator.sub)

  File ~\anaconda3\Lib\site-packages\pandas\core\series.py:5819 in _arith_method
    return base.IndexOpsMixin._arith_method(self, other, op)

  File ~\anaconda3\Lib\site-packages\pandas\core\base.py:1381 in _arith_method
    result = ops.arithmetic_op(lvalues, rvalues, op)

  File ~\anaconda3\Lib\site-packages\pandas\core\ops\array_ops.py:285 in arithmetic_op
    res_values = _na_arithmetic_op(left, right, op) # type: ignore[arg-type]

  File ~\anaconda3\Lib\site-packages\pandas\core\ops\array_ops.py:229 in _na_arithmetic_op
    result = _masked_arith_op(left, right, op)

  File ~\anaconda3\Lib\site-packages\pandas\core\ops\array_ops.py:165 in _masked_arith_op
    result[mask] = op(xrav[mask], yrav[mask])

TypeError: unsupported operand type(s) for -: 'str' and 'str'

```
In [38]: type                              'EXPECTED_DELIVERY_DATE'
Out[38]: pandas.core.series.Series

In [39]:                                  'ACTUAL_DLVRY_DATE'   =
    .                                     'ACTUAL_DLVRY_DATE'

In [40]: print                            'ACTUAL_DLVRY_DATE' .
0    2024-01-16
1    2024-01-13
2    2024-01-16
3    2024-01-16
4    2024-01-16
Name: ACTUAL_DLVRY_DATE, dtype: datetime64[ns]

In [41]:                              'EXPECTED_DELIVERY_DATE'   =
    .                                 'EXPECTED_DELIVERY_DATE'

In [42]:                          'Difference'   =
                        'ACTUAL_DLVRY_DATE'   -
                        'EXPECTED_DELIVERY_DATE'   .   .

In [43]: print                            'Difference' .
0    0
1   -3
2    3
3    0
4   -1
Name: Difference, dtype: int64

In [44]: print                    'ACTUAL_DLVRY_DATE' .      2
   ...: print                     'EXPECTED_DELIVERY_DATE' .      2
   ...: print                     'Difference' .      2
0    2024-01-16
1    2024-01-13
Name: ACTUAL_DLVRY_DATE, dtype: datetime64[ns]
0    2024-01-16
1    2024-01-16
Name: EXPECTED_DELIVERY_DATE, dtype: datetime64[ns]
0    0
1   -3
Name: Difference, dtype: int64

In [45]: print                        .      10
   UNIQUE_IDENTIFIER START_THE_CLOCK_DATE  ...   Late  Difference
0    287864672115059          2024-01-12  ...  False           0
1    287622480065041          2024-01-11  ...  False          -3
2    287828034502413          2024-01-12  ...   True           3
3    287828036242497          2024-01-12  ...  False           0
4    287689980420454          2024-01-12  ...  False          -1
5    287408670214292          2024-01-11  ...  False          -3
6    287802401772312          2024-01-12  ...  False           0
7    287802401266754          2024-01-12  ...  False           0
8    287670400374045          2024-01-12  ...  False          -1
9    287118560311811          2024-01-12  ...  False          -1

[10 rows x 14 columns]

In [46]:                    =                                   'Difference'  > 0
```

```
In [47]:                       =                                    'Late'  == True

In [48]:                       =                                    'Late'  == True

In [49]:             =                          .                                        .

In [50]:                 =
                                 .                                    .

In [51]:       =                  'Difference' .

In [52]:          =                     'Difference' .

In [53]: print "The mean for mail delivered late is: " + str          + " days after
expected delivery date"
The mean for mail delivered late is: 1.9556293532076514 days after expected delivery date

In [54]: print "The mean for mail delivered late is: " + str "%f" %          + " days after
expected delivery date"
The mean for mail delivered late is: 1.955629 days after expected delivery date

In [55]:              =                  .           = "MAIL_CLASS"  "Late"  .        # True =
Late, False = either Early or On Time Exactly

In [56]: print
MAIL_CLASS              Late
First Class Presort     True    972736
Periodicals             True     27322
Single Piece First Class  True    811385
USPS Marketing Mail     True    944140
dtype: int64

In [57]:              =                  .           = "MAIL_CLASS"  "Difference"  .        #
True = Late, False = either Early or On Time Exactly

In [58]: print
MAIL_CLASS              Difference
First Class Presort     1              457482
                        2              105264
                        3              220840
                        4              140535
                        5               39176
                        6                5482
                        7                2202
                        8                 965
                        9                 663
                        10               113
                        11                14
Periodicals             1               18051
                        2                5506
                        3                1653
                        4                1110
                        5                 440
                        6                 238
                        7                 140
                        8                 118
                        9                  60
                        10                 6
Single Piece First Class  1             366897
```

```
                            2           127668
                            3           170358
                            4            86932
                            5            31786
                            6            14106
                            7             7623
                            8             3876
                            9             1619
                            10             520
USPS Marketing Mail         1           694905
                            2           156839
                            3            52583
                            4            21396
                            5             7277
                            6             5131
                            7             4004
                            8             1443
                            9              562
dtype: int64
```

In [**59**]:   =   .   = *"MAIL_SHAPE" "Difference"* .   #
True = Late, False = either Early or On Time Exactly

In [**60**]: print

```
MAIL_SHAPE  Difference
Card        1             29796
            2             13202
            3             26948
            4             27079
            5              3062
            6              1110
            7              1033
            8               155
            9                23
            10                2
Flat        1             76032
            2             28747
            3             19968
            4              9575
            5              3503
            6              1333
            7              1412
            8               493
            9               148
            10               12
Letter      1           1431507
            2            353328
            3            398518
            4            213319
            5             72114
            6             22514
            7             11524
            8              5754
            9              2733
            10              625
            11               14
dtype: int64
```

In [**61**]:   =   .   = *"MAIL_CLASS" "Difference"* .

```
KeyboardInterrupt
```

In [**62**]:   =   .   = *"MAIL_CLASS"* *"Difference"*

In [**63**]: print   .

```
KeyboardInterrupt
```

In [**64**]: