Key Workshop

For this workshop, please attempt to solve the following problems. Although you might use any method to solve the problems, especially for the purpose of verifying results, please write solutions which use the **key** operator `⌸` for the main parts of the computations.

The data

The comma-separated values file order_data.csv contains information about orders on a Brazilian E-commerce website from 3rd October 2016 to 29th August 2018, inclusive. This data has been adapted from data made available by Olist Store under CC BY-NC-SA 4.0.

The data has the following columns:

column name	description	type
id	unique ID for this order	number
timestamp	timestamp for this order in the format `YYYY-MM-DD hh:mm:ss`	character
city	city of residence for this customer	character
state	2-letter state code for the state of residence for this customer	character
payment	payment amount in Brazilian Real	number
category	product category name	character

Problems

Payment per state

Write a function `PaymentPerState` which:

- accepts a nested vector of character vectors of state codes
- returns the total payment in each given state across the whole dataset.

```
      PaymentPerState 'GO' 'TO' 'SC'
319766.98 58068.18 579297.82
```

Payment per month

Write a function `PaymentPerMonth` which:

- accepts a state code or nested vector of state codes
- returns a simple numeric vector (shape `12`) or matrix (shape `(≠⍵),12`) of the total payment in each state in each month of 2017 in order left-to-right from January to December.

```
      months←'Mmm'(1200⌶)29×⍳12
      states←'SP' 'RJ' 'PI' 'MT'

      PaymentPerMonth 'SP'
43103.53 80348.6 140767.23 130989.25 188394.13 185274.77 197902.88 212931.9
231109.84 239321.27 391137.77 301554.04

      ppm←PaymentPerMonth states

      ⍉((⊂''),months),⍪states,ppm
            SP          RJ       PI        MT
 Jan   43103.53   13139.53  1453.98   1922.78
 Feb    80348.6    33197.29  3298.4    3583.36
 Mar  140767.23   59495.67  2582.92   2702.55
 Apr  130989.25   61960.3   2288.91   3912.86
 May  188394.13   75293.52  6679.58   7560.36
 Jun  185274.77   59246.08  2626.96   4788.16
 Jul  197902.88   84167.86  2938.77  11235.49
 Aug  212931.9    85555.98  5072.72   6939.29
 Sep  231109.84  104566.94  3242.68   8101.66
 Oct  239321.27  108026.61  4544.47  12828.51
 Nov  391137.77  166838.56  3745.39  13144.66
 Dec  301554.04  124615.01  3482     10432.55
```

Payment per quarter

Write a function `PaymentPerQuarter` which:

- accepts a nested vector of character vectors of state codes
- returns a simple numeric vector or matrix of the total payment in each state in each quarter of 2017.

```
      quarters←'Jan-Mar' 'Apr-Jun' 'Jul-Sep' 'Oct-Dec'
      states←'SP' 'RJ' 'PI' 'MT'
      ppq←PaymentPerQuarter states

      ((⊂''),states),⍪quarters,ppq
       Jan-Mar    Apr-Jun    Jul-Sep    Oct-Dec
SP  264219.36  504658.15  641944.62  932013.08
RJ  105832.49  196499.9   274290.78  399480.18
PI    7335.3    11595.45   11254.17   11771.86
MT    8208.69   16261.38   26276.44   36405.72
```