Dyalog APL Problem Solving Competition

Michael Higginson

My Story

My Story

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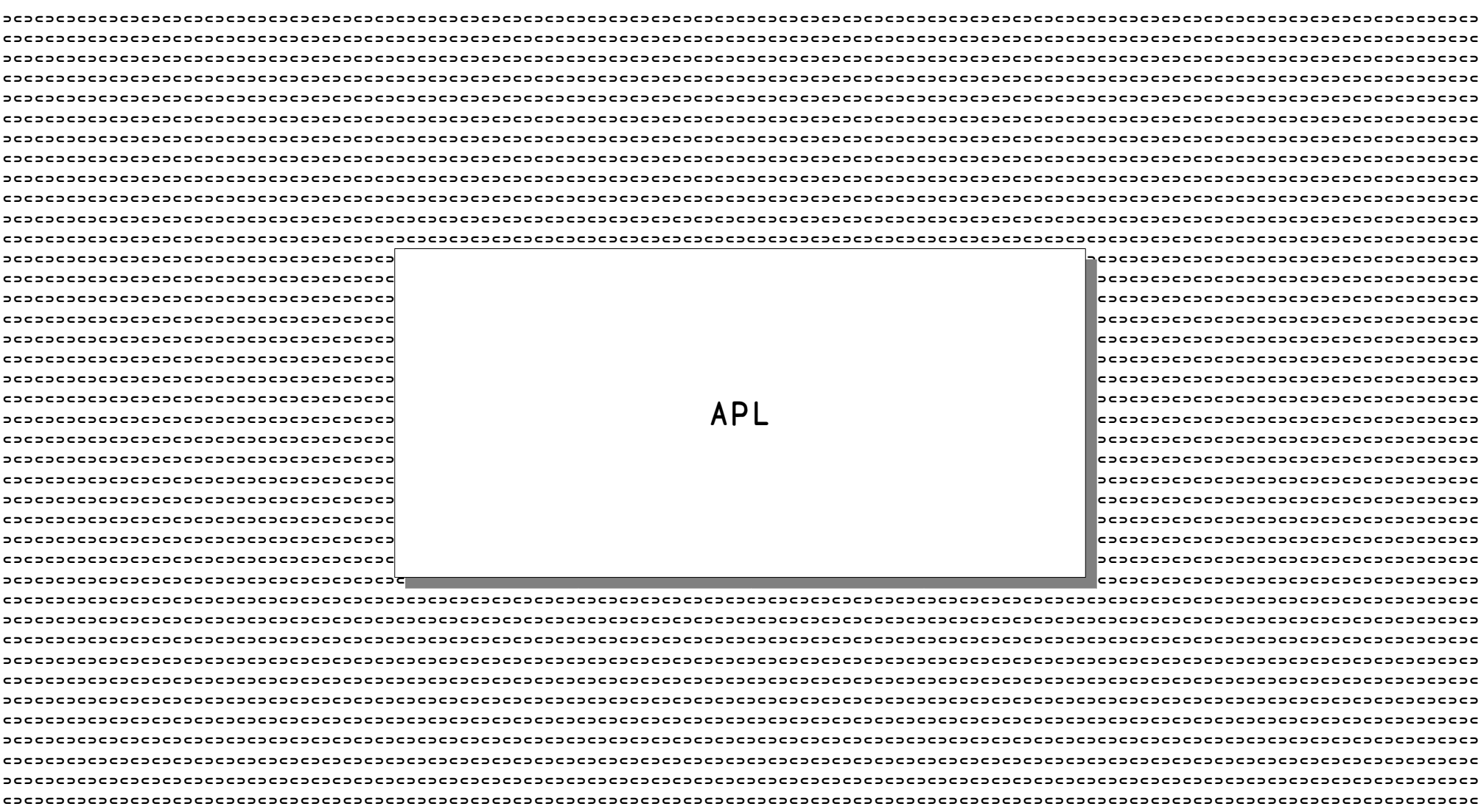
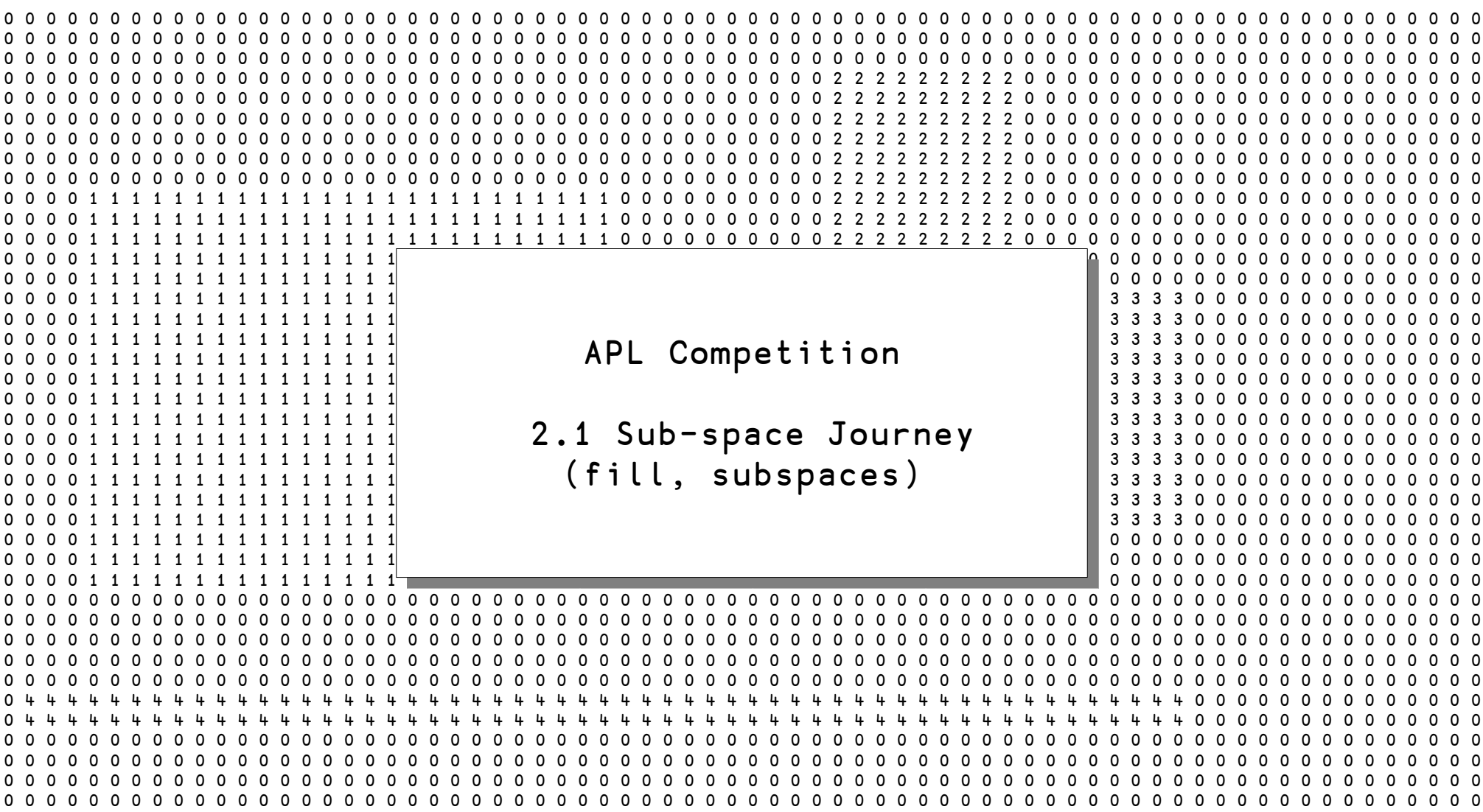
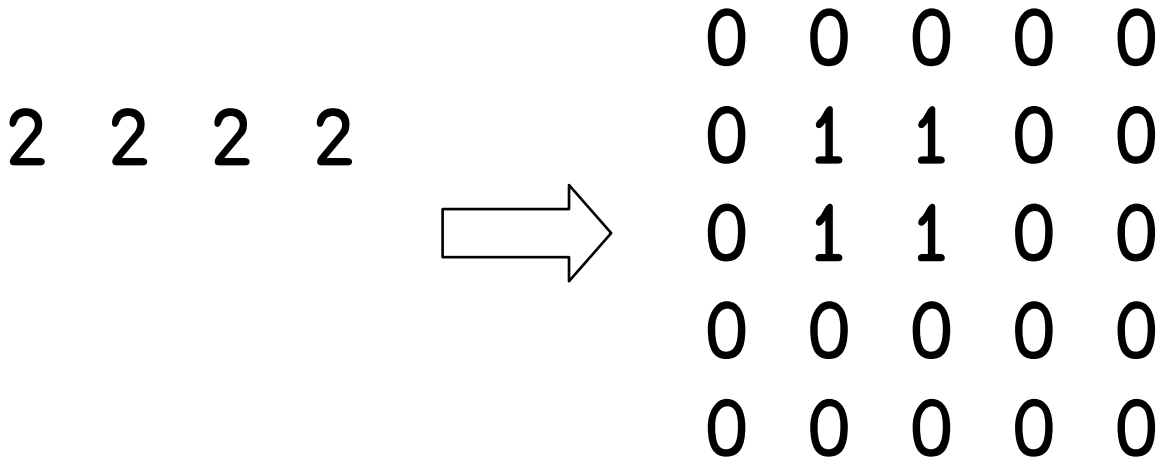
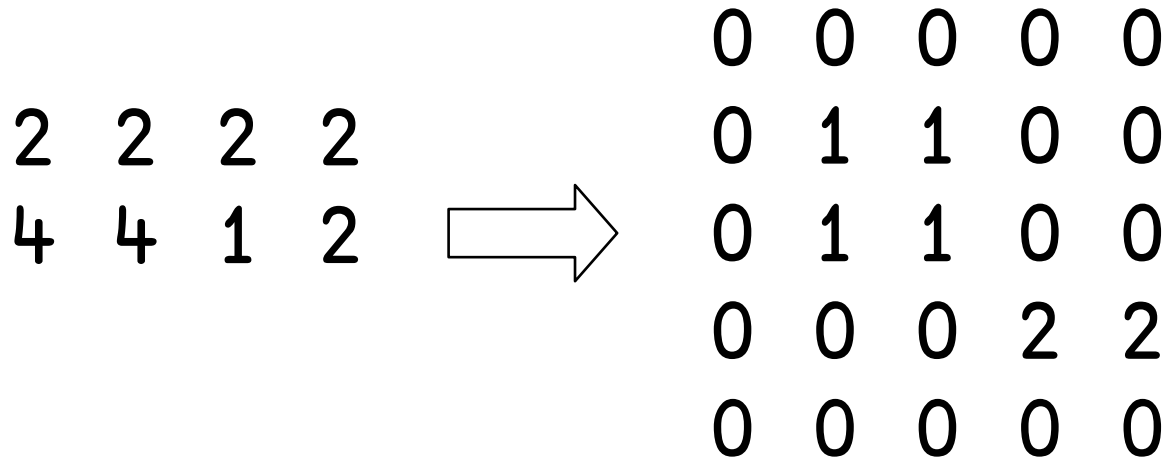

APL


APL Competition
2.1 Sub-space Journey
(fill, subspaces)

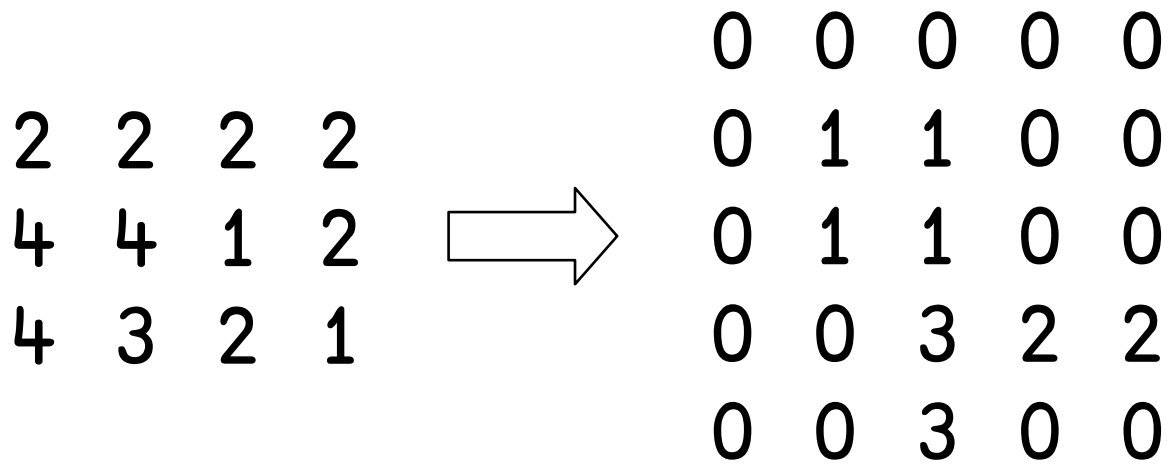
5 5 fill m



5 5 fill m



5 5 fill m



5 5 fill m

```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix        ⍝ Cap and flatten indexes
    r[ix]←lab              ⍝ Assign labels
    r
}
```

5 5 fill m

```
fill←{
    r←⍺⍴0                ⍝ (R)esult array
    k←≢⍺                 ⍝ Space ran(k)

    sp←k↑[2]⍵            ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵            ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh          ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp         ⍝ Subspace (i)nde(x)es

    vol←×/sh             ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵      ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix      ⍝ Cap and flatten indexes
    r[ix]←lab            ⍝ Assign labels
    r
}
```

5 5 fill m

```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix        ⍝ Cap and flatten indexes
➡   r[ix]←lab              ⍝ Assign labels
    r
}
```

5 5 fill m

```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌷⊃,/,¨ix        ⍝ Cap and flatten indexes
    r[ix]←lab              ⍝ Assign labels
    r
}
```

5 5 fill m

```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix        ⍝ Cap and flatten indexes
    r[ix]←lab              ⍝ Assign labels
    r
}
```

5 5 fill m

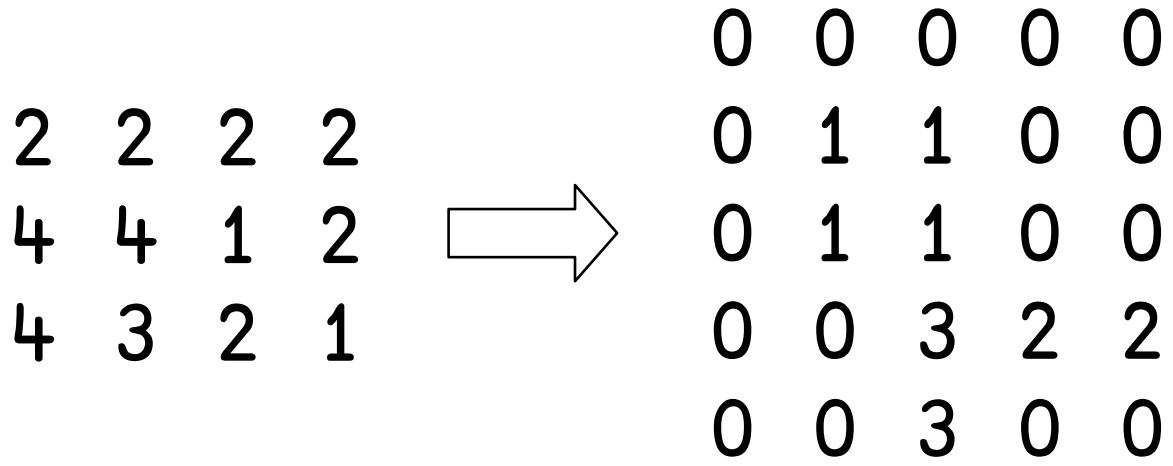
```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix        ⍝ Cap and flatten indexes
    r[ix]←lab              ⍝ Assign labels
    r
}
```

5 5 fill m

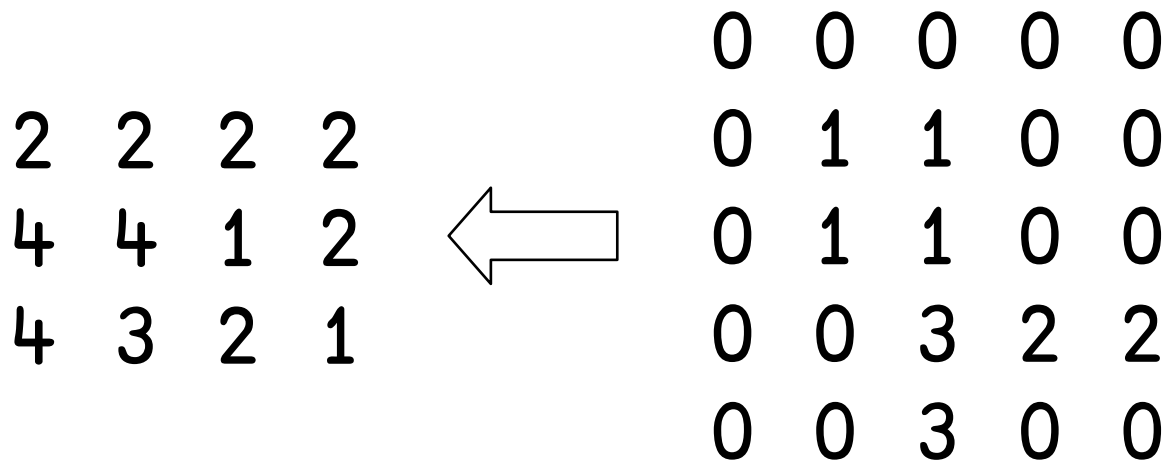
```
fill←{
    r←αρ0                     ⍝ (R)esult array
    k←≢α                      ⍝ Space ran(k)

    sp←k↑[2]ω                 ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]ω                 ⍝ Subspace (sh)apes
    io←¯1+ι¨↓sh               ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp              ⍝ Subspace (i)nde(x)es

    vol←×/sh                  ⍝ Subspace (vol)umes
  → lab←⊃,/volρ¨ι≢ω           ⍝ Subspace (lab)els, flattened

    ix←(⊂α)⌊⊃,/,¨ix           ⍝ Cap and flatten indexes
    r[ix]←lab                 ⍝ Assign labels
    r
}
```

5 5 fill m

```
fill←{
    r←⍺⍴0                  ⍝ (R)esult array
    k←≢⍺                   ⍝ Space ran(k)

    sp←k↑[2]⍵              ⍝ Subspace (s)tarting (p)oints
    sh←k↓[2]⍵              ⍝ Subspace (sh)apes
    io←¯1+⍳¨↓sh            ⍝ Subspace (i)ndex (o)ffsets
    ix←io+¨⊂¨↓sp           ⍝ Subspace (i)nde(x)es

    vol←×/sh               ⍝ Subspace (vol)umes
    lab←⊃,/vol⍴¨⍳≢⍵        ⍝ Subspace (lab)els, flattened

    ix←(⊂⍺)⌊⊃,/,¨ix        ⍝ Cap and flatten indexes
    r[ix]←lab              ⍝ Assign labels
    r
}
```


2 2 2 2
4 4 1 2
4 3 2 1
0 0 0 0 0
0 1 1 0 0
0 1 1 0 0
0 0 3 2 2
0 0 3 0 0

subspaces r

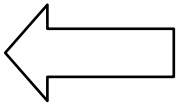


subspaces ω

$$\begin{matrix} 2 & 4 \\ 7 & 2 \end{matrix} \Leftarrow 0\ 1\ 1\ 1\ 1\ 0\ 2\ 2\ 0\ 0$$

subspaces ω

1 2 2 1 2 2
1 4 4 2 2 1



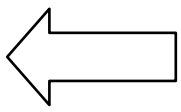
0 0 0 0 0
0 1 1 0 0
0 1 1 0 0
0 0 0 2 0
0 0 0 0 0

0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 2 0
0 0 0 0 0

subspaces ω

0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...

1 2 2 1 2 2
1 4 4 2 2 1



0 0 0 0 0

0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 2 0
0 0 0 0 0

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←ρρ⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(ρ⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←⍴⍴⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(⍴⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←⍴⍴⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(⍴⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←⍴⍴⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(⍴⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←⍴⍴⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(⍴⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←⍴⍴⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(⍴⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←ρρ⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(ρ⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

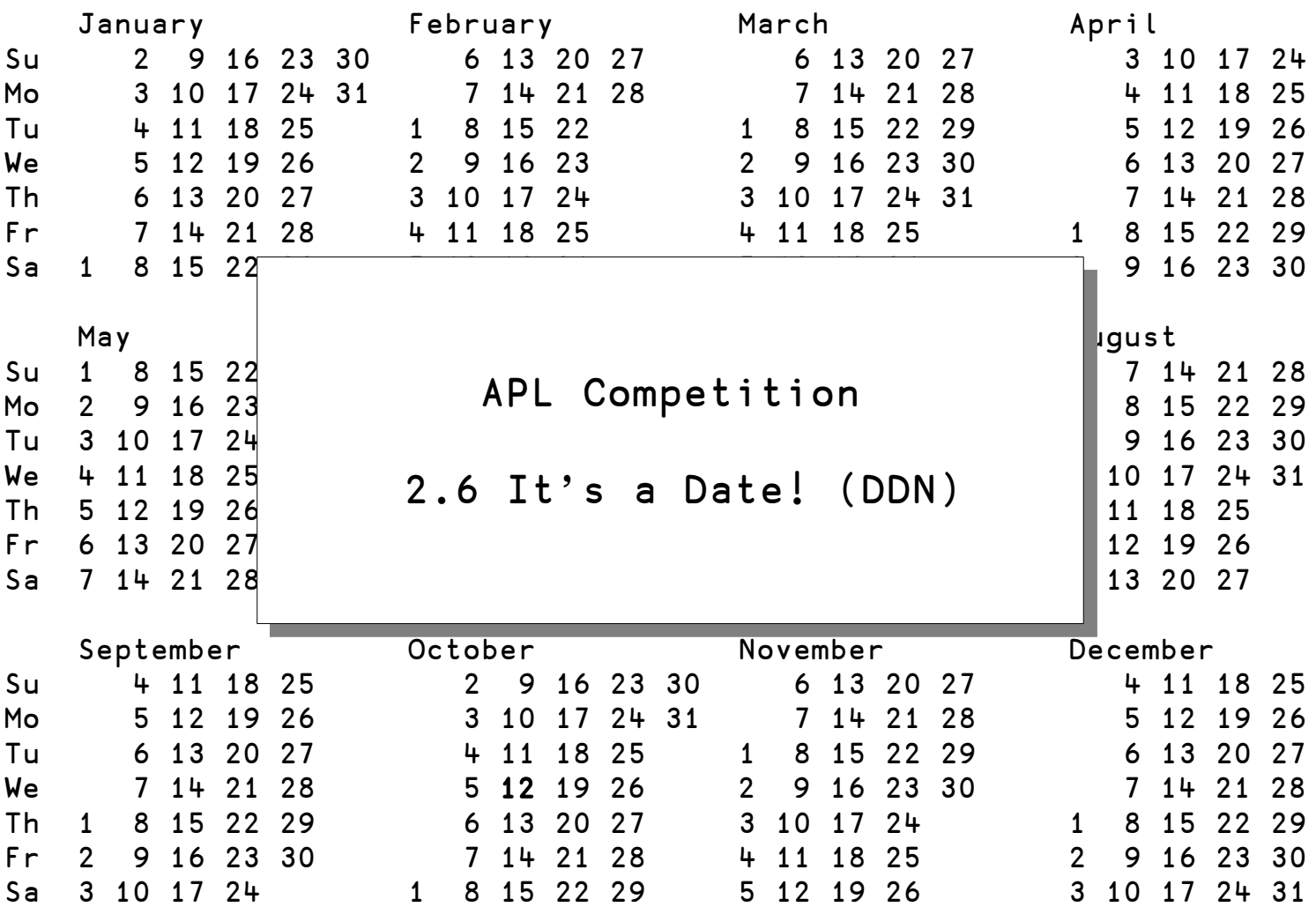
subspaces ⍵

```
0 0 0 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 ...
```

```
subspaces←{
    r←ρρ⍵                          ⍝ Space's (r)ank
    f←,⍵                           ⍝ Space (f)lattened
    l←⍳⌈/f                         ⍝ Subspace (l)abels

    a←f⍳l                          ⍝ Find first occurrences
    z←1+(≢f)-(⌽f)⍳l                ⍝ Find last occurrences
    a z←(ρ⍵)∘{↓⍉1+⍺⊤⍵-1}¨a z       ⍝ Convert first/last to ⍵-index space

    sh←1+z-a                       ⍝ Compute subspace (sh)apes
    ↑a,¨sh                         ⍝ Marry first indexes and shapes
}
```

APL Competition

2.6 It’s a Date! (DDN)



α DDN ω

⍺ DDN ⍵

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200⌶) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

α DDN ω

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200I) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07' ⇨ 44608.63203

α DDN ω

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200I) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07' ⇨ 44608.63203

'MM/DD/YY tP:mm' DDN '02/17/22 3P:39' ⇨ 44608.65215

⍺ DDN ⍵

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200⌶) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07' ⇨ 44608.63203

'MM/DD/YY tP:mm' DDN '02/17/22 3P:39' ⇨ 44608.65215

'Dddd' DDN 'Thursday' ⇨ 43208

α DDN ω

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200I) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

```
⍝
⍝    Pattern    Cat Len Num Variations
⍝
m←⍬⍪ 'YY'       '1' 2   1   ⍬
m←m⍪ 'YYYY'     'Y' 4   1   ⍬
m←m⍪ 'M'        'M' 0   1   ⍬
m←m⍪ 'MM'       'M' 2   1   (⊂'_M')
m←m⍪ 'MMM'      'M' 3   0   ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM'     'M' 0   0   ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D'        'D' 0   1   ⍬
m←m⍪ 'DD'       'D' 2   1   (⊂'_D')
m←m⍪ 'h'        'h' 0   1   ⍬
m←m⍪ 'hh'       'h' 2   1   (⊂'_h')
m←m⍪ 'm'        'm' 0   1   ⍬
m←m⍪ 'mm'       'm' 2   1   (⊂'_m')
m←m⍪ 's'        's' 0   1   ⍬
m←m⍪ 'ss'       's' 2   1   (⊂'_s')
m←m⍪ 'd'        'd' 1   1   ⍬
m←m⍪ 'ddd'      'd' 3   0   ('DDD' 'Ddd' '_dd')
m←m⍪ 'dddd'     'd' 0   0   ('DDDD' 'Dddd' '_ddd')
m←m⍪ 'w'        'w' 0   1   ⍬
m←m⍪ 'ww'       'w' 2   1   (⊂'_w')
m←m⍪ 'WW'       '2' 2   1   ⍬
m←m⍪ 'WWWW'     'W' 4   1   ⍬
m←m⍪ 'y'        'y' 0   1   ⍬
m←m⍪ 'yy'       'y' 3   1   (⊂'_y')
m←m⍪ 'O'        'O' 1   0   (⊂'o')
m←m⍪ 'OO'       'O' 2   0   ('Oo' 'oo')
m←m⍪ 't'        't' 0   1   ⍬
m←m⍪ 'tt'       't' 2   1   (⊂'_t')
m←m⍪ 'P'        'P' 1   0   (⊂'p')
m←m⍪ 'PP'       'P' 2   0   (⊂'pp')
```

⇨ 'Thu, 17-Feb-2022 15:10:07'

:10:07' ⇨ 44608.63203

⇨ 44608.65215

⇨ 43208

⇨ 44608.63203

```
⍝
⍝    Pattern     Cat Len Num Variations
⍝
m←⍬⍪ 'YY'        '1' 2   1   ⍬
m←m⍪ 'YYYY'      'Y' 4   1   ⍬
m←m⍪ 'M'         'M' 0   1   ⍬
m←m⍪ 'MM'        'M' 2   1   (⊂'_M')
m←m⍪ 'MMM'       'M' 3   0   ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM'      'M' 0   0   ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D'         'D' 0   1   ⍬
m←m⍪ 'DD'        'D' 2   1   (⊂'_D')
m←m⍪ 'h'         'h' 0   1   ⍬
m←m⍪ 'hh'        'h' 2   1   (⊂'_h')
m←m⍪ 'm'         'm' 0   1   ⍬
m←m⍪ 'mm'        'm' 2   1   (⊂'_m')
m←m⍪ 's'         's' 0   1   ⍬
m←m⍪ 'ss'        's' 2   1   (⊂'_s')
m←m⍪ 'd'         'd' 1   1   ⍬
m←m⍪ 'ddd'       'd' 3   0   ('DDD' 'Ddd' '_dd')
m←m⍪ 'dddd'      'd' 0   0   ('DDDD' 'Dddd' '_ddd')
m←m⍪ 'w'         'w' 0   1   ⍬
m←m⍪ 'ww'        'w' 2   1   (⊂'_w')
m←m⍪ 'WW'        '2' 2   1   ⍬
m←m⍪ 'WWWW'      'W' 4   1   ⍬
m←m⍪ 'y'         'y' 0   1   ⍬
m←m⍪ 'yy'        'y' 3   1   (⊂'_y')
m←m⍪ 'O'         'O' 1   0   (⊂'o')
m←m⍪ 'OO'        'O' 2   0   ('Oo' 'oo')
m←m⍪ 't'         't' 0   1   ⍬
m←m⍪ 'tt'        't' 2   1   (⊂'_t')
m←m⍪ 'P'         'P' 1   0   (⊂'p')
m←m⍪ 'PP'        'P' 2   0   (⊂'pp')
```

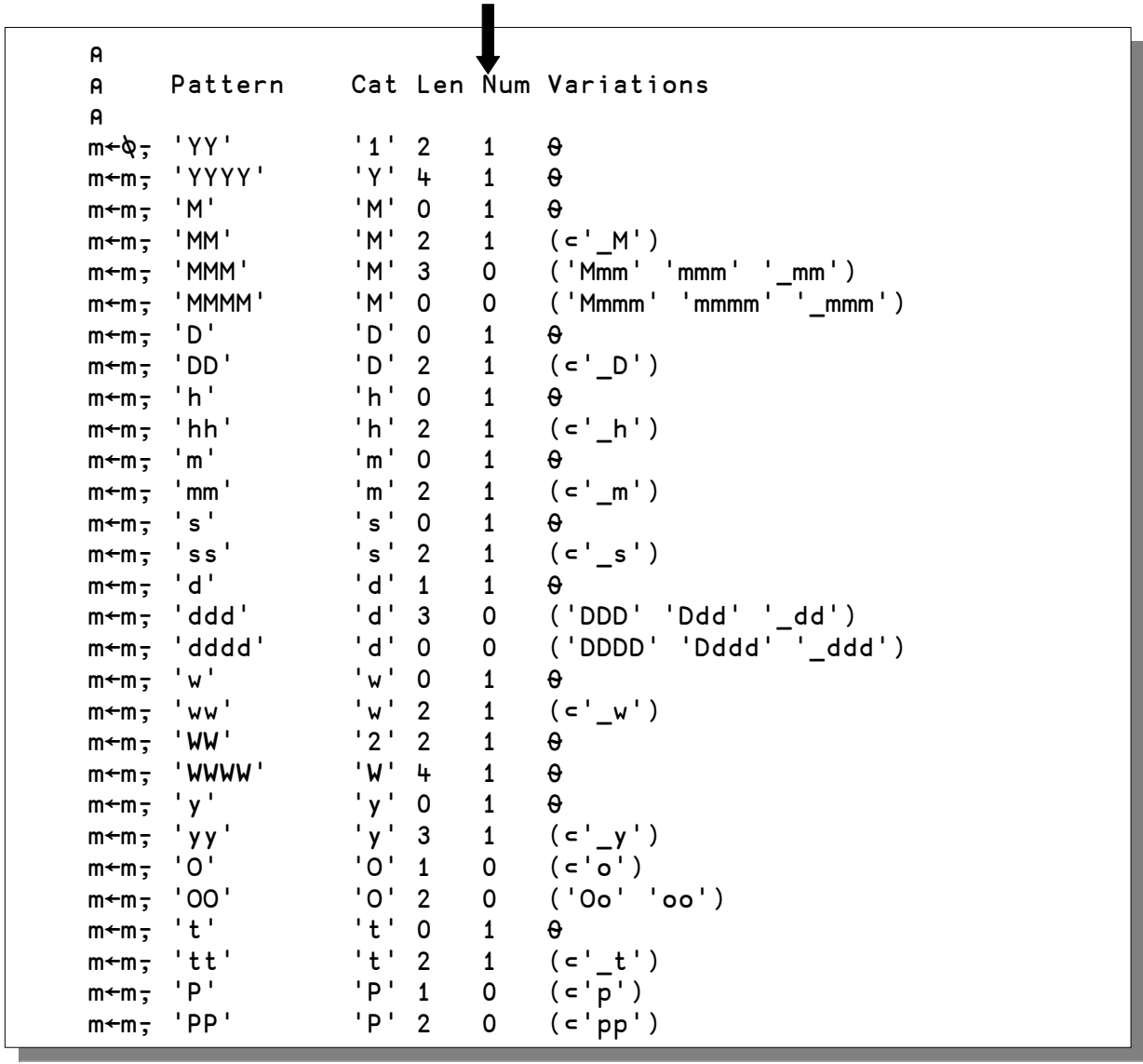
⇨ 'Thu, 17-Feb-2022 15:10:07'

:10:07' ⇨ 44608.63203

⇨ 44608.65215

⇨ 43208

⇨ 44608.63203



```
⍝
⍝    Pattern    Cat Len Num Variations
⍝
m←⍬⍪ 'YY'       '1' 2   1   ⍬
m←m⍪ 'YYYY'     'Y' 4   1   ⍬
m←m⍪ 'M'        'M' 0   1   ⍬
m←m⍪ 'MM'       'M' 2   1   (⊂'_M')
m←m⍪ 'MMM'      'M' 3   0   ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM'     'M' 0   0   ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D'        'D' 0   1   ⍬
m←m⍪ 'DD'       'D' 2   1   (⊂'_D')
m←m⍪ 'h'        'h' 0   1   ⍬
m←m⍪ 'hh'       'h' 2   1   (⊂'_h')
m←m⍪ 'm'        'm' 0   1   ⍬
m←m⍪ 'mm'       'm' 2   1   (⊂'_m')
m←m⍪ 's'        's' 0   1   ⍬
m←m⍪ 'ss'       's' 2   1   (⊂'_s')
m←m⍪ 'd'        'd' 1   1   ⍬
m←m⍪ 'ddd'      'd' 3   0   ('DDD' 'Ddd' '_dd')
m←m⍪ 'dddd'     'd' 0   0   ('DDDD' 'Dddd' '_ddd')
m←m⍪ 'w'        'w' 0   1   ⍬
m←m⍪ 'ww'       'w' 2   1   (⊂'_w')
m←m⍪ 'WW'       '2' 2   1   ⍬
m←m⍪ 'WWWW'     'W' 4   1   ⍬
m←m⍪ 'y'        'y' 0   1   ⍬
m←m⍪ 'yy'       'y' 3   1   (⊂'_y')
m←m⍪ 'O'        'O' 1   0   (⊂'o')
m←m⍪ 'OO'       'O' 2   0   ('Oo' 'oo')
m←m⍪ 't'        't' 0   1   ⍬
m←m⍪ 'tt'       't' 2   1   (⊂'_t')
m←m⍪ 'P'        'P' 1   0   (⊂'p')
m←m⍪ 'PP'       'P' 2   0   (⊂'pp')
```

⇨ 'Thu, 17-Feb-2022 15:10:07'

:10:07' ⇨ 44608.63203

⇨ 44608.65215

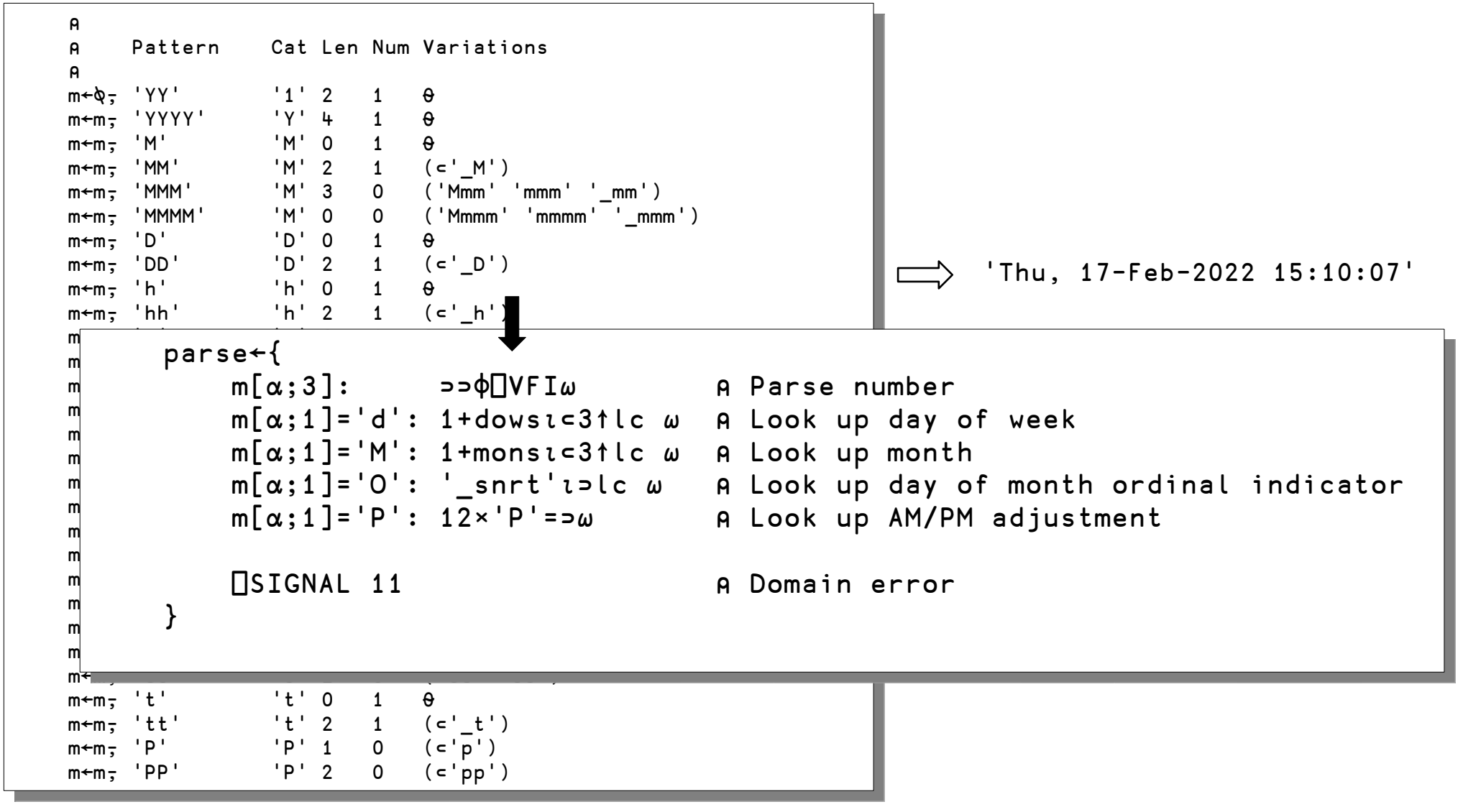
⇨ 43208

⇨ 44608.63203

```
⍝
⍝    Pattern    Cat Len Num Variations
⍝
m←⍉⍪ 'YY'       '1' 2   1   ⍬
m←m⍪ 'YYYY'     'Y' 4   1   ⍬
m←m⍪ 'M'        'M' 0   1   ⍬
m←m⍪ 'MM'       'M' 2   1   (⊂'_M')
m←m⍪ 'MMM'      'M' 3   0   ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM'     'M' 0   0   ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D'        'D' 0   1   ⍬
m←m⍪ 'DD'       'D' 2   1   (⊂'_D')
m←m⍪ 'h'        'h' 0   1   ⍬
m←m⍪ 'hh'       'h' 2   1   (⊂'_h')
m
m
m
m
m
m
m
m
m
m
m
m
m
m
m←
m←m⍪ 't'        't' 0   1   ⍬
m←m⍪ 'tt'       't' 2   1   (⊂'_t')
m←m⍪ 'P'        'P' 1   0   (⊂'p')
m←m⍪ 'PP'       'P' 2   0   (⊂'pp')
```

⇨ 'Thu, 17-Feb-2022 15:10:07'

```
parse←{
    m[⍺;3]:        ⊃⊃⌽⎕VFI⍵           ⍝ Parse number
    m[⍺;1]='d': 1+dows⍳⊂3↑lc ⍵   ⍝ Look up day of week
    m[⍺;1]='M': 1+mons⍳⊂3↑lc ⍵   ⍝ Look up month
    m[⍺;1]='O': '_snrt'⍳⊃lc ⍵    ⍝ Look up day of month ordinal indicator
    m[⍺;1]='P': 12×'P'=⊃⍵         ⍝ Look up AM/PM adjustment

    ⎕SIGNAL 11                     ⍝ Domain error
}
```


⍝
⍝ Pattern Cat Len Num Variations
⍝
m←⍬⍪ 'YY' '1' 2 1 ⍬
m←m⍪ 'YYYY' 'Y' 4 1 ⍬
m←m⍪ 'M' 'M' 0 1 ⍬
m←m⍪ 'MM' 'M' 2 1 (⊂'_M')
m←m⍪ 'MMM' 'M' 3 0 ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM' 'M' 0 0 ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D' 'D' 0 1 ⍬
m←m⍪ 'DD' 'D' 2 1 (⊂'_D')
m←m⍪ 'h' 'h' 0 1 ⍬
m←m⍪ 'hh' 'h' 2 1 (⊂'_h')
m←m⍪ 't' 't' 0 1 ⍬
m←m⍪ 'tt' 't' 2 1 (⊂'_t')
m←m⍪ 'P' 'P' 1 0 (⊂'p')
m←m⍪ 'PP' 'P' 2 0 (⊂'pp')
'Thu, 17-Feb-2022 15:10:07'
parse←{
m[⍺;3]: ⊃⊃⎕VFI⍵ ⍝ Parse number
m[⍺;1]='d': 1+dows⍳⊂3↑⎕lc ⍵ ⍝ Look up day of week
m[⍺;1]='M': 1+mons⍳⊂3↑⎕lc ⍵ ⍝ Look up month
m[⍺;1]='O': '_snrt'⍳⊃⎕lc ⍵ ⍝ Look up day of month ordinal indicator
m[⍺;1]='P': 12×'P'=⊃⍵ ⍝ Look up AM/PM adjustment
⎕SIGNAL 11 ⍝ Domain error
}

```
⍝
⍝    Pattern    Cat Len Num Variations
⍝
m←⍬⍪ 'YY'       '1' 2   1   ⍬
m←m⍪ 'YYYY'     'Y' 4   1   ⍬
m←m⍪ 'M'        'M' 0   1   ⍬
m←m⍪ 'MM'       'M' 2   1   (⊂'_M')
m←m⍪ 'MMM'      'M' 3   0   ('Mmm' 'mmm' '_mm')
m←m⍪ 'MMMM'     'M' 0   0   ('Mmmm' 'mmmm' '_mmm')
m←m⍪ 'D'        'D' 0   1   ⍬
m←m⍪ 'DD'       'D' 2   1   (⊂'_D')
m←m⍪ 'h'        'h' 0   1   ⍬
m←m⍪ 'hh'       'h' 2   1   (⊂'_h')
m←m⍪ 'm'        'm' 0   1   ⍬
m←m⍪ 'mm'       'm' 2   1   (⊂'_m')
m←m⍪ 's'        's' 0   1   ⍬
m←m⍪ 'ss'       's' 2   1   (⊂'_s')
m←m⍪ 'd'        'd' 1   1   ⍬
m←m⍪ 'ddd'      'd' 3   0   ('DDD' 'Ddd' '_dd')
m←m⍪ 'dddd'     'd' 0   0   ('DDDD' 'Dddd' '_ddd')
m←m⍪ 'w'        'w' 0   1   ⍬
m←m⍪ 'ww'       'w' 2   1   (⊂'_w')
m←m⍪ 'WW'       '2' 2   1   ⍬
m←m⍪ 'WWWW'     'W' 4   1   ⍬
m←m⍪ 'y'        'y' 0   1   ⍬
m←m⍪ 'yy'       'y' 3   1   (⊂'_y')
m←m⍪ 'O'        'O' 1   0   (⊂'o')
m←m⍪ 'OO'       'O' 2   0   ('Oo' 'oo')
m←m⍪ 't'        't' 0   1   ⍬
m←m⍪ 'tt'       't' 2   1   (⊂'_t')
m←m⍪ 'P'        'P' 1   0   (⊂'p')
m←m⍪ 'PP'       'P' 2   0   (⊂'pp')
```

⇨ 'Thu, 17-Feb-2022 15:10:07'

:10:07' ⇨ 44608.63203

⇨ 44608.65215

⇨ 43208

⇨ 44608.63203

α DDN ω

'Ddd, DD-Mmm-YYYY hh:mm:ss' (1200I) 44608.63203 ⇨ 'Thu, 17-Feb-2022 15:10:07'

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

α DDN ω

A 2022

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

α DDN ω

A 2022

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 ...

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

α DDN ω

ᴀ 2022

```
1 1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
```

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

α DDN ω

A 2022

```
1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...
```

'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'	⇨	44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'	⇨	44608.65215
'Dddd' DDN 'Thursday'	⇨	43208
'MMDDYYYYhhmmss' DDN '02172022151007'	⇨	44608.63203

α DDN ω

```
⍝ 2022

1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...
```

```
...  1  1  1  1  1  1  1  1 ...  2  2  2  2  2  2  2  2  2  2  2 ...  2  2  3  3  3 ...
... 15 16 17 18 19 20 21 22 ... 10 11 12 13 14 15 16 17 18 19 20 ... 27 28  1  2  3 ...
...  6  7  1  2  3  4  5  6 ...  4  5  6  7  1  2  3  4  5  6  7 ...  7  1  2  3  4 ...
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'   ⇨   44608.63203
             'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'            ⇨   44608.65215
                     'Dddd' DDN 'Thursday'                    ⇨         43208
             'MMDDYYYYhhmmss' DDN '02172022151007'            ⇨   44608.63203
```

α DDN ω

```
⍝ 2022

1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...
```

```
...  1  1  1  1  1  1  1  1 ...  2  2  2  2  2  2  2  2  2  2  2 ...  2  2  3  3  3 ...
... 15 16 17 18 19 20 21 22 ... 10 11 12 13 14 15 16 17 18 19 20 ... 27 28  1  2  3 ...
...  0  0  0  0  0  1  0  0 ...  1  0  0  0  0  0  0  1  0  0  0 ...  0  0  0  0  1 ... ⍝ Thurs (= 4)
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'   ⇨   44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'                         ⇨   44608.65215
'Dddd' DDN 'Thursday'                                         ⇨   43208
'MMDDYYYYhhmmss' DDN '02172022151007'                         ⇨   44608.63203
```

α DDN ω

```
⍝ 2022

1 1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1 2 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7 1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3 4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...

... 1 1 1 1 1 1 1 1 ... 2 2 2 2 2 2 2 2 2 2 2 ... 2 2 3 3 3 ...
... 0 0 1 0 0 0 0 0 ... 0 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 0 ... ⍝ 17th  (=17)
... 0 0 0 0 0 1 0 0 ... 1 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 1 ... ⍝ Thurs (= 4)
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'   ⇨   44608.63203
               'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'             ⇨   44608.65215
                         'Dddd' DDN 'Thursday'                   ⇨         43208
               'MMDDYYYYhhmmss' DDN '02172022151007'             ⇨   44608.63203
```

α DDN ω

A 2022

```
1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  3  3  3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1  2  3  4  5  6  7  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1  2  3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4 ...

...  0  0  0  0  0  0  0  0 ...  1  1  1  1  1  1  1  1  1  1  1 ...  1  1  0  0  0 ... A Feb   (= 2)
...  0  0  1  0  0  0  0  0 ...  0  0  0  0  0  0  0  1  0  0  0 ...  0  0  0  0  0 ... A 17th  (=17)
...  0  0  0  0  0  1  0  0 ...  1  0  0  0  0  0  0  1  0  0  0 ...  0  0  0  0  1 ... A Thurs (= 4)
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'  ⇨  44608.63203

'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'  ⇨  44608.65215

'Dddd' DDN 'Thursday'  ⇨  43208

'MMDDYYYYhhmmss' DDN '02172022151007'  ⇨  44608.63203
```

α DDN ω

```
⍝ 2022

1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...

... 0 0 0 0 0 0 0 0 ... 1 1 1 1 1 1 1 1 1 1 1 ... 1 1 0 0 0 ... ⍝ Feb   (= 2)
... 0 0 1 0 0 0 0 0 ... 0 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 0 ... ⍝ 17th  (=17)
... 0 0 0 0 0 1 0 0 ... 1 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 1 ... ⍝ Thurs (= 4)

... 0 0 0 0 0 0 0 0 ... 0 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 0 ... ⍝ ∧⌿
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'   ⇨   44608.63203
'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'                         ⇨   44608.65215
'Dddd' DDN 'Thursday'                                         ⇨   43208
'MMDDYYYYhhmmss' DDN '02172022151007'                         ⇨   44608.63203
```

α DDN ω

```
⍝ 2022

1 1 1 1 1 1 1 1 1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1 2 2 2 2 2 2 2 2 2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2 3 3 3 ...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 ...
6 7 1 2 3 4 5 6 7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 5 6 7 1 2 3  4  5  6  7  1  2  3  4  5  6  7  1  2  3  4  5  6  7  1 2 3 4 ...
```

```
... 0 0 0 0 0 0 0 0 ... 1 1 1 1 1 1 1 1 1 1 1 ... 1 1 0 0 0 ... ⍝ Feb   (= 2)
... 0 0 1 0 0 0 0 0 ... 0 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 0 ... ⍝ 17th  (=17)
... 0 0 0 0 0 1 0 0 ... 1 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 1 ... ⍝ Thurs (= 4)

... 0 0 0 0 0 0 0 0 ... 0 0 0 0 0 0 0 1 0 0 0 ... 0 0 0 0 0 ... ⍝ ∧⌿
                                      48                        ⍝ ⊃⍸
```

```
'Ddd, DD-Mmm-YYYY hh:mm:ss' DDN 'Thu, 17-Feb-2022 15:10:07'    ⇨    44608.63203

             'MM/DD/YY tP:mm' DDN '02/17/22 3P:39'              ⇨    44608.65215

                     'Dddd' DDN 'Thursday'                      ⇨          43208

             'MMDDYYYYhhmmss' DDN '02172022151007'              ⇨    44608.63203
```

Thank you!