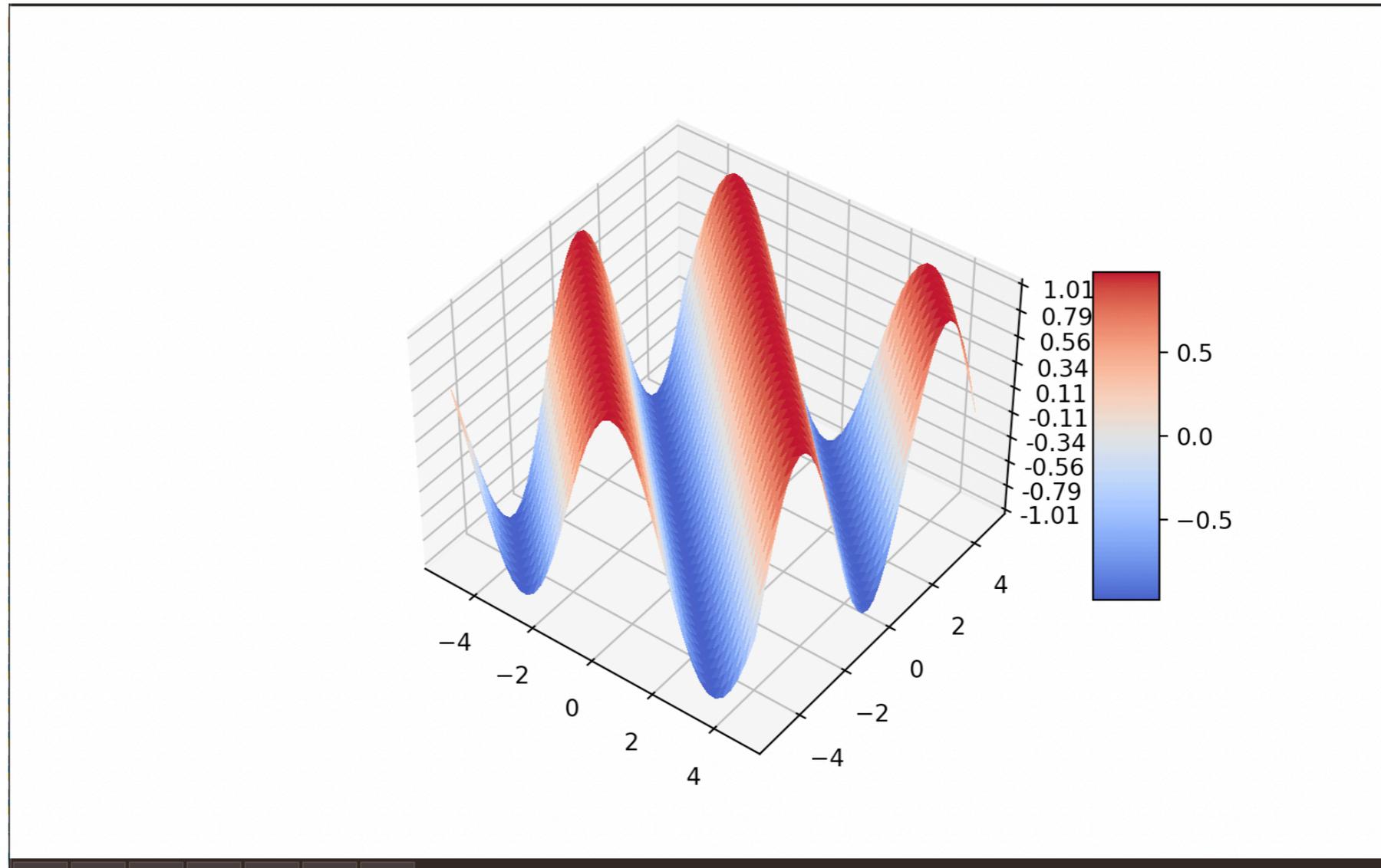


Ex13 、 14

EX13A 繪製2D函數

- Plot the 2D sin function

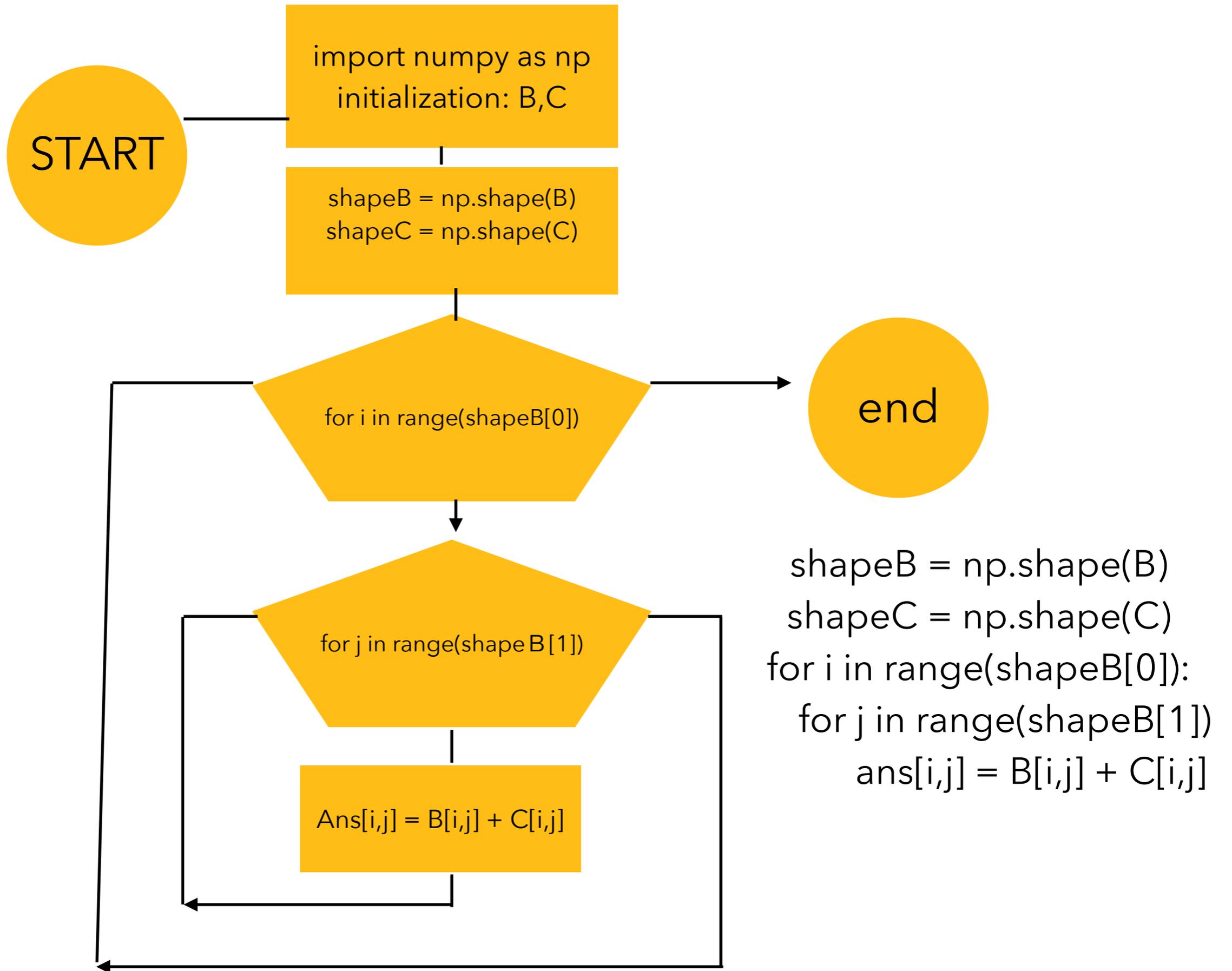


EX13B 繪製2D函數mysin

```
def mysin(x):
    a0 = np.array([[ -0.3918, -0.3918], [ -0.0975, -0.0975],
                  [ -0.3304, -0.3303], [ -0.2186, -0.2185],
                  [ -0.3472, -0.3472]])
    b0 = np.array(
        [[ -3.5903], [ 0.1043], [ 1.9609], [ 1.1944], [ -1.0927]])
    a = np.array([[ -0.6988, -0.1312, 0.5554, -2.1678, -0.1380],
                  [ -0.2736, -4.3798, 0.7643, 5.0048, -2.2072],
                  [ 0.4992, -3.2731, -0.8272, 2.2502, 0.5677]])
    b = np.array([[ 0.6347], [ -0.3891], [ -0.1289]])
    r = np.array([ -16.7872, 7.2905, 36.4077, 7.4048])
    z = a0 @ x[0, :]
    h0 = np.reshape(z, np.shape(b0)) + b0
    v = np.tanh(h0)
    h1 = a @ v + b
    v2 = np.tanh(h1)
    y_hat = r[0:3] @ v2 + r[3]
    return y_hat
```

```
shapeX = np.shape(X)
Z = np.zeros((shapeX[0], shapeX[1]))
v = np.random.rand(1, 2)
for i in range(shapeX[0]):
    for j in range(shapeX[1]):
        v[0, 0] = X[i, j]
        v[0, 1] = Y[i, j]
        Z[i, j] = mysin(v)
```

矩陣相加流程圖



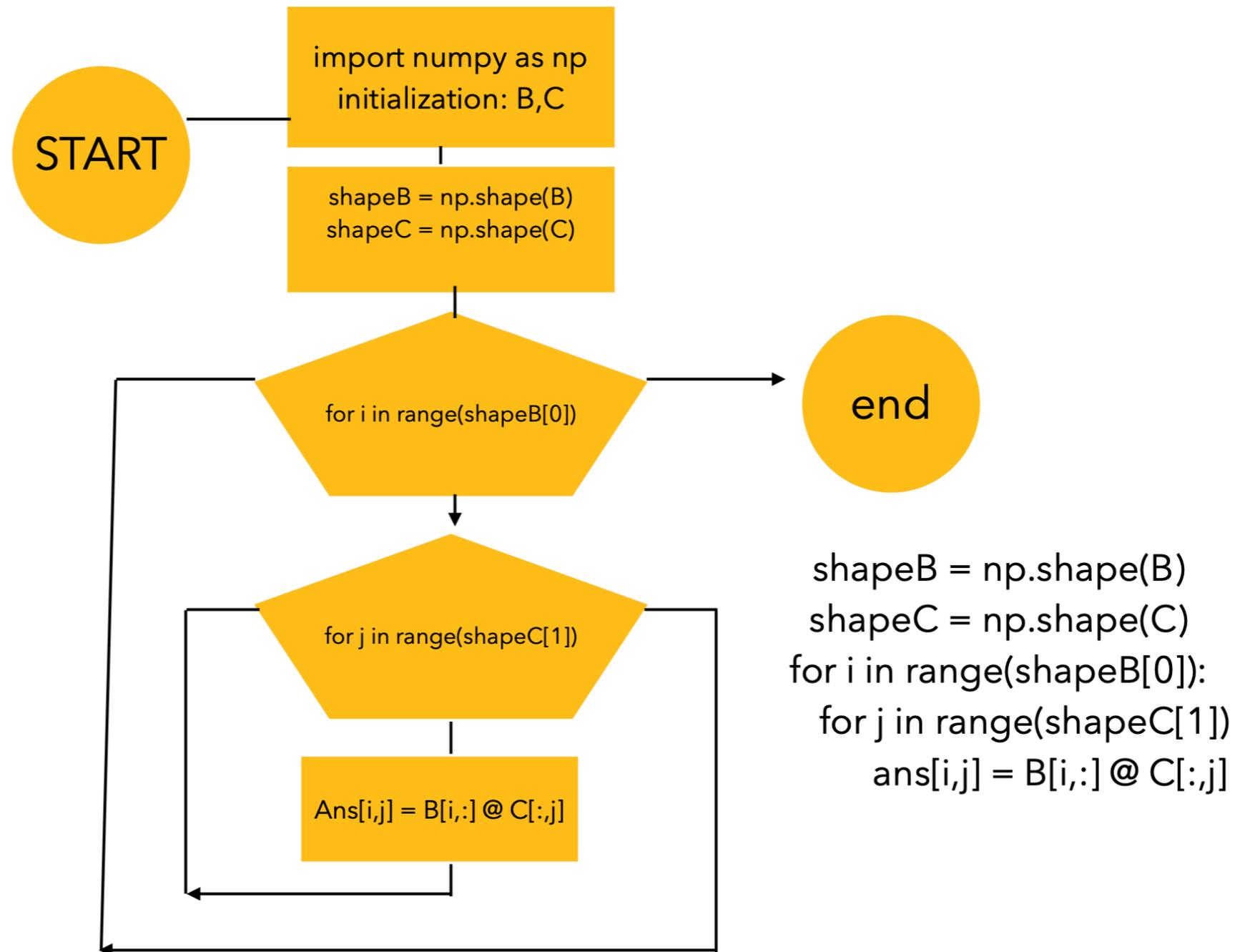
Ex14A. 使用巢狀迴圈計算 下列兩個矩陣的相加矩陣

```
[ [ 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 32 33 34 35 36 37 38 39 40]
  [ 41 42 43 44 45 46 47 48 49 50]
  [ 51 52 53 54 55 56 57 58 59 60]
  [ 61 62 63 64 65 66 67 68 69 70]
  [ 71 72 73 74 75 76 77 78 79 80]
  [ 81 82 83 84 85 86 87 88 89 90]
  [ 91 92 93 94 95 96 97 98 99 100] ]
```

```
[ [ 1  11  21  31  41  51  61  71  81  91]
  [ 2  12  22  32  42  52  62  72  82  92]
  [ 3  13  23  33  43  53  63  73  83  93]
  [ 4  14  24  34  44  54  64  74  84  94]
  [ 5  15  25  35  45  55  65  75  85  95]
  [ 6  16  26  36  46  56  66  76  86  96]
  [ 7  17  27  37  47  57  67  77  87  97]
  [ 8  18  28  38  48  58  68  78  88  98]
  [ 9  19  29  39  49  59  69  79  89  99]
  [ 10 20  30  40  50  60  70  80  90 100] ]
```

實作矩陣乘法

- 請參考流程圖實作矩陣乘法



- 請以下列矩陣測試矩陣乘法程式

$$\begin{array}{l} B[0,:] \\ \begin{bmatrix} \del{2} & \del{5} & \del{3} & \del{9} \\ 3 & 8 & 3 & 0 \\ 1 & 7 & 3 & 0 \\ 7 & 9 & 5 & 0 \end{bmatrix} \end{array} \times \begin{array}{l} C[:,0] \\ \begin{bmatrix} \del{2} & \del{3} & \del{1} & \del{7} \\ 5 & 8 & 7 & 9 \\ 3 & 3 & 3 & 5 \\ 9 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

```
[ [ 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 32 33 34 35 36 37 38 39 40]
  [ 41 42 43 44 45 46 47 48 49 50]
  [ 51 52 53 54 55 56 57 58 59 60]
  [ 61 62 63 64 65 66 67 68 69 70]
  [ 71 72 73 74 75 76 77 78 79 80]
  [ 81 82 83 84 85 86 87 88 89 90]
  [ 91 92 93 94 95 96 97 98 99 100] ]
```

```
[ [ 1  11 21 31 41 51 61 71 81 91]
  [ 2  12 22 32 42 52 62 72 82 92]
  [ 3  13 23 33 43 53 63 73 83 93]
  [ 4  14 24 34 44 54 64 74 84 94]
  [ 5  15 25 35 45 55 65 75 85 95]
  [ 6  16 26 36 46 56 66 76 86 96]
  [ 7  17 27 37 47 57 67 77 87 97]
  [ 8  18 28 38 48 58 68 78 88 98]
  [ 9  19 29 39 49 59 69 79 89 99]
  [ 10 20 30 40 50 60 70 80 90 100] ]
```