

The 2024 VCE General math exam asked what is the largest cost saving that can be achieved if a fifth person can also be allocated a task, given that the existing four people are already allocated so as to achieve the minimum cost.

Before starting this activity, you will need the latest version of the small, free program **AssignII**, from charliewatson.com/classpad/

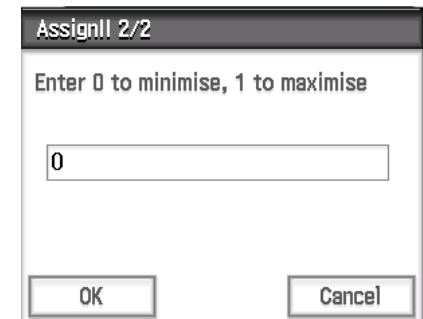
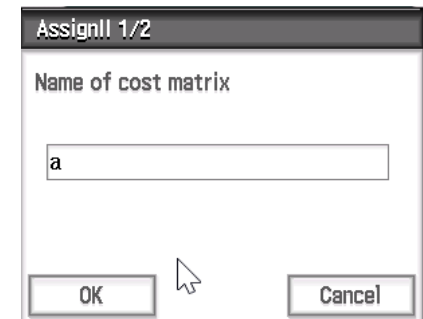
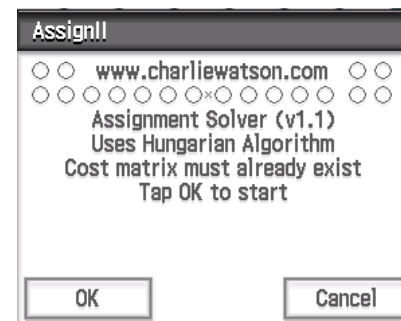
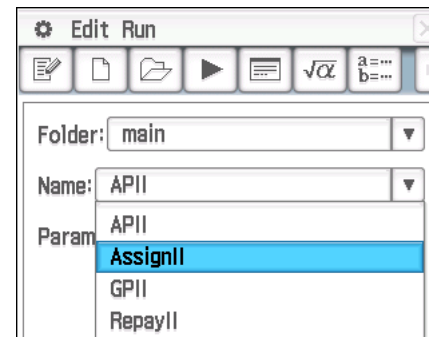
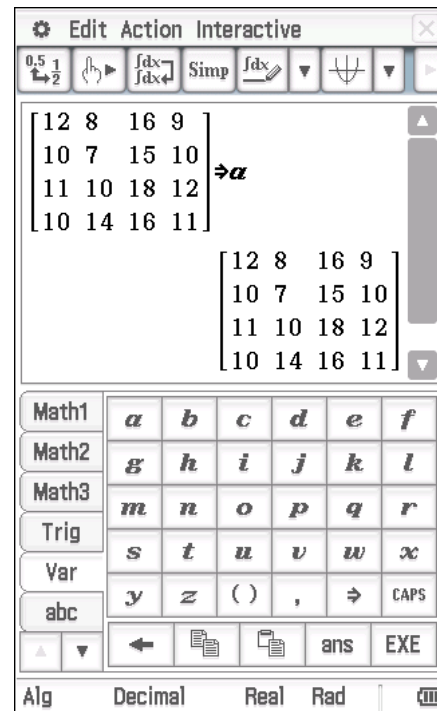
Start in the Main app and create the original cost matrix for the assignment problem.

From the Program app, select the program **AssignII** and tap the play button.

Enter the name of the cost matrix and then enter 0 to choose the minimise option.

	Task 1	Task 2	Task 3	Task 4
Anush	12	8	16	9
Blake	10	7	15	10
Carly	11	10	18	12
Dexter	10	14	16	11

	Task 1	Task 2	Task 3	Task 4
Edgar	9	5	14	8



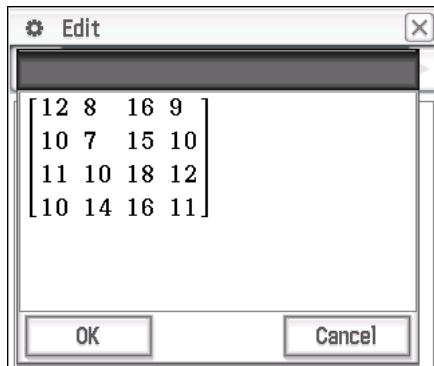
Check that you're using the correct cost matrix and tap OK.

If working is required, copy down the matrix shown after each step and note how it was obtained. Then tap OK.

Various screens will be displayed depending on the options chosen and original cost matrix. Tap OK after each.

Here information about how the zeros in the previous matrix were covered and the smallest number left uncovered is displayed.

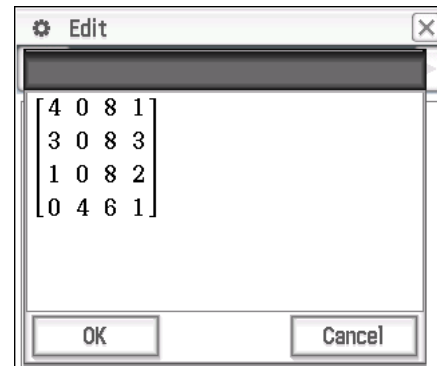
The algorithm then produced the matrix in the top half of the screen.



Original cost matrix

12	8	16	9
10	7	15	10
11	10	18	12
10	14	16	11

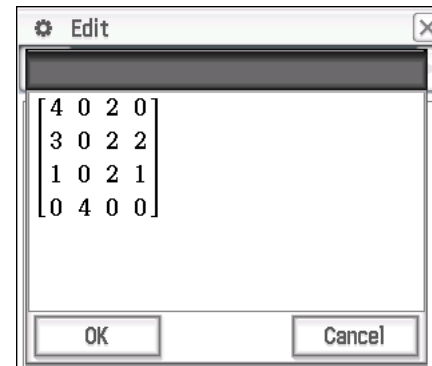
Original cost matrix



Original cost matrix
Reducing rows
Subtracted 8, 7, 10, 10

4	0	8	1
3	0	8	3
1	0	8	2
0	4	6	1

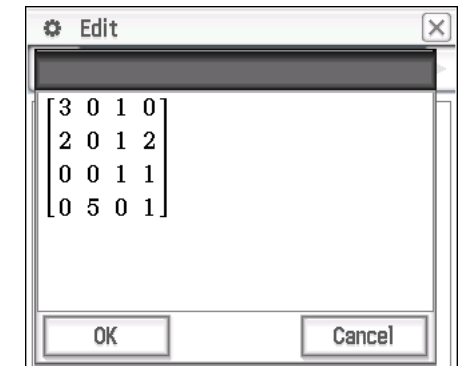
Original cost matrix



Original cost matrix
Reducing rows
Subtracted 8, 7, 10, 10
Reducing columns
Subtracted 0, 0, 6, 1

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

Original cost matrix



Original cost matrix
Reducing rows
Subtracted 8, 7, 10, 10
Reducing columns
Subtracted 0, 0, 6, 1
Looking for optimum solution
In previous matrix cover
Row(s) 4 Col(s) 2, 4
Smallest uncovered was 1
Adjusted matrix now shown

3	0	1	0
2	0	1	2
0	0	1	1
0	5	0	1

Original cost matrix

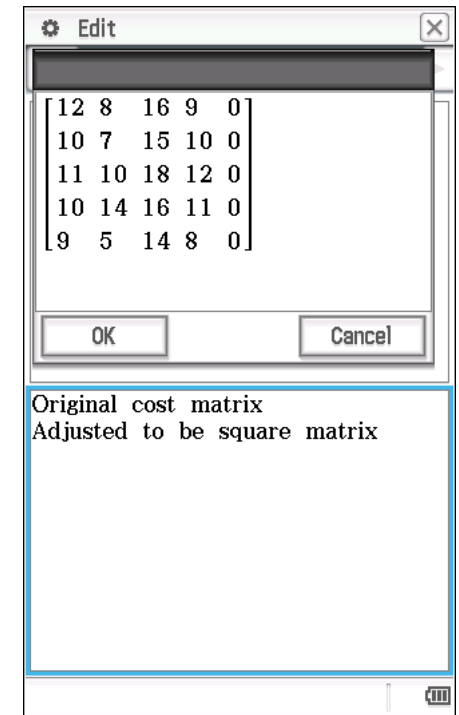
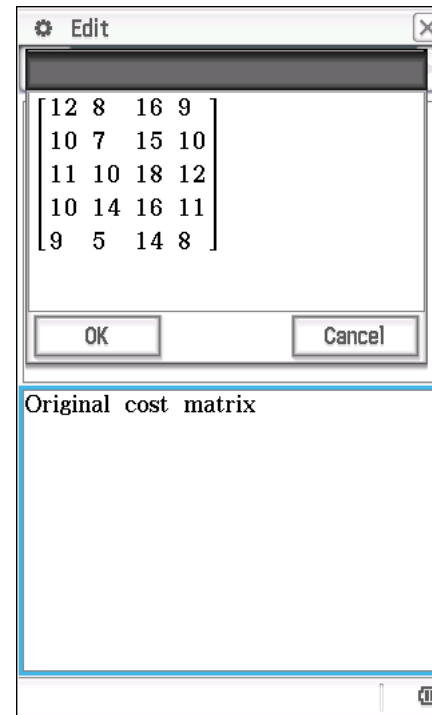
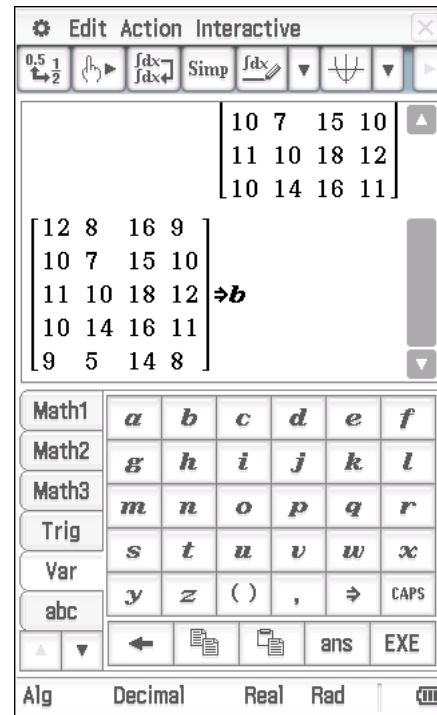
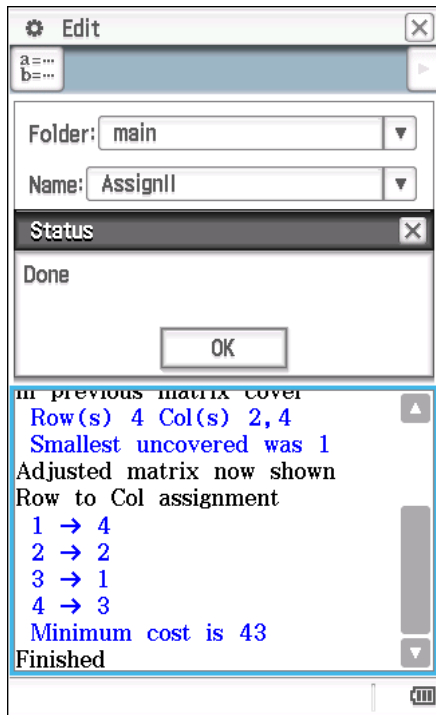
Now we can return to Main and set up another matrix to include the fifth person and then back to Program to run **AssignII** again.

Eventually the optimum assignment is displayed, together with the associated cost.

Note that we could have chosen to create both matrices at the same time.

The program is started.

The program will add dummy rows or columns to make the matrix square.



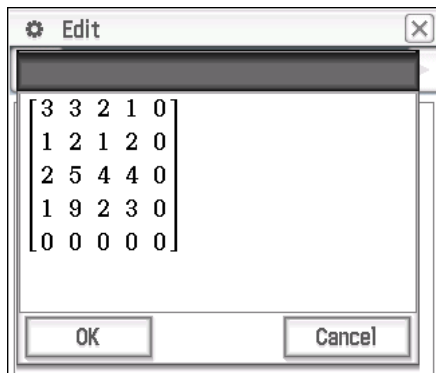
Only columns require reducing this time.

Here information about how the zeros in the previous matrix were covered and the smallest number left uncovered is displayed.

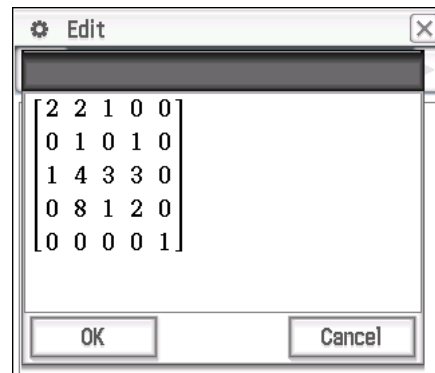
The algorithm then produced the matrix in the top half of the screen.

Eventually the optimum assignment is displayed, together with the associated cost.

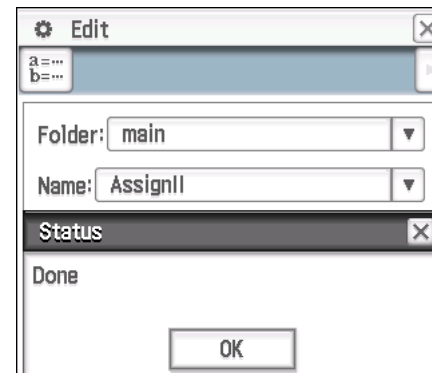
It can be seen that the cost has decreased from 43 to 39, saving 4.



Original cost matrix
Adjusted to be square matrix
Reducing columns
Subtracted 9, 5, 14, 8, 0



Original cost matrix
Adjusted to be square matrix
Reducing columns
Subtracted 9, 5, 14, 8, 0
Looking for optimum solution
In previous matrix cover
Row(s) 5 Col(s) 5
Smallest uncovered was 1
Adjusted matrix now shown



row(s) 5 Col(s) 5
Smallest uncovered was 1
Adjusted matrix now shown
Row to Col assignment
1 → 4
2 → 3
3 → 5
4 → 1
5 → 2
Minimum cost is 39
Finished