1. What is the value of min1, ind1? 
What is the value of min2, ind2?

\[
X = \begin{bmatrix} 2 & 7 & 3 \\ 5 & 2 & 1 \\ 8 & 9 & 4 \end{bmatrix};
\]

\[
[min1, ind1] = \text{min} \ (X(:,1))
\]

\[
[min2, ind2] = \text{min} \ (X(:,3))
\]

Ans:

\[
\begin{align*}
\text{min1} &= 2; \quad \text{ind1}=1 \\
\text{min2} &= 1; \quad \text{ind2}=2
\end{align*}
\]
2. What is the value $Z$?

\[ X = \begin{bmatrix} 2 & 7 & 3; \\ 5 & 2 & 1; \\ 8 & 9 & 4 \end{bmatrix} \]

\[ Y = [7 \ 9 \ 2 \ 4 \ 0 \ 6]; \]

$[\text{minimum, index}] = \text{min}\ (X(:,3));$

$Z = Y(\text{index})$

\[
\text{Ans} \\
Z = 9
\]
3. What is the value \( Z \)?

\[
X = \begin{bmatrix} 2 & 7 & 3; & 5 & 2 & 1; & 8 & 9 & 4 \end{bmatrix}
\]

\[
Y = \begin{bmatrix} 2 & 2 & 2; & 4 & 5 & 6; & 8 & 8 & 8 \end{bmatrix};
\]

\[
[\text{minimum, index}] = \min (X(3,:));
\]

\[
Z = Y(\text{index, index})
\]

Ans

\[
Z = 8
\]
costs(1,1,2,1) = 12;
costs(1,1,2,2) = 7;

costs(2,1,3,1) = 5;
costs(2,1,3,2) = 6;
costs(2,1,3,3) = 9;

costs(2,2,3,1) = 14;
costs(2,2,3,2) = 10;
costs(2,2,3,3) = 11;

costs(3,1,4,1) = 8;
costs(3,1,4,2) = 7;
costs(3,1,4,3) = 10;

costs(3,2,4,1) = 9;
costs(3,2,4,2) = 7;
costs(3,2,4,3) = 9;

costs(3,3,4,1) = 10;
costs(3,3,4,2) = 7;
costs(3,3,4,3) = 8;

costs(4,1,5,1) = 5;
costs(4,2,5,1) = 9;
costs(4,3,5,1) = 8;

num_states = [1 2 3 3 1];
4. What is the value of ...?

Answers in red

a. \( \text{costs}(3,2,4,3) = 9 \)
b. \( \text{costs}(3,3,4,:) = [10 \ 7 \ 8] \)
c. \( \min (\text{costs}(3,1,4,:)) = 7 \)
d. \( \max (\text{costs}(2,2,3,:)) = 14 \)
e. \( \min (\text{costs}(3,3,4,1:\text{num\_states}(4))) = 7 \)
f. \[ \text{[minimum, index]} = \min (\text{costs}(3,3,4,1:\text{num\_states}(4))) \]
   \( \text{minimum} = 7 \)
   \( \text{index} = 2 \)
5. What is the value of $ind1$, $path\_length$ ?

ind1 = 2; path\_length = 7

Ans

path\_length = 0;
[min, ind1] = min (costs(1,1,2,1:num\_states(2)));
path\_length = path\_length + min;
6. What is the value of \( \text{ind2}, \text{path\_length} \) (at end)?

\[
\text{path\_length} = 0; \\
[\text{minimum}, \text{ind1}] = \min (\text{costs}(1,1,2,1:1:\text{num\_states}(2))) \\
\text{path\_length} = \text{path\_length} + \text{minimum}; \\
[\text{minimum}, \text{ind2}] = \min (\text{costs}(2,\text{ind1},3,1:1:\text{num\_states}(3))) \\
\text{path\_length} = \text{path\_length} + \text{minimum}
\]

\[
\text{Ans} \quad \text{ind2} = 2; \text{path\_length} = 17
\]
7. What is the value of `path_length` at A and at B?

num_states = [1 2 3 3 1];

path_length = 0;
current_stage = 1;
current_state = 1;
[minimum,index] = min(costs(current_stage,current_state,current_stage+1,1:num_states(current_stage+1)))
path_length = path_length + minimum

A

current_stage = current_stage + 1;
current_state = index;
[minimum,index] = min(costs(current_stage,current_state,current_stage+1,1:num_states(current_stage+1)))
path_length = path_length + minimum

B

Ans   
A path_length = 7
B path_length = 17
8. What is the value of path_length and path at the end of the loop when current_stage 2?

```matlab
num_states = [1 2 3 3 1];

current_state = 1;
path_length = 0;
path = 0;
for current_stage = 1 : 4
    [minimum, index] = min(costs(current_stage, current_state, current_state+1, 1:4));
    path_length = path_length + minimum;
    path(current_stage) = index;
    current_state = index;
end

Ans  path = [2 2]; path_length = 17
```