



4. a) Write the shortest possible one-line Matlab® command to create the matrix  $B$  shown below.

$$B = \begin{bmatrix} e^1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & e^1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

```
>> A=[exp(eye(2)),zeros(2,5)]
```

Explanation:  $e^0=1$  so we can write  $B$  as follows.

$$B = \begin{bmatrix} e^1 & e^0 & 0 & 0 & 0 & 0 & 0 \\ e^0 & e^1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} = \begin{bmatrix} e^1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & e^1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

- b) Given the values in matrix  $B$  for part (a), find the value of  $B(\text{eye}(2)+3)$

```
ans =
    2.7183    1.0000
    1.0000    2.7183
```

Explanation:  $\text{eye}(2)+3 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + 3 = \begin{bmatrix} 4 & 3 \\ 3 & 4 \end{bmatrix}$

In linear form,  $B = \begin{bmatrix} e^1 \\ 1 \\ 1 \\ e^1 \\ 0 \\ \vdots \end{bmatrix} = \begin{bmatrix} B(1) \\ B(2) \\ B(3) \\ B(4) \\ B(5) \\ B(6) \end{bmatrix}$

so  $B \left( \begin{bmatrix} 4 & 3 \\ 3 & 4 \end{bmatrix} \right) = \begin{bmatrix} B(4) & B(3) \\ B(3) & B(4) \end{bmatrix} \begin{bmatrix} e & 1 \\ 1 & e \end{bmatrix}$

- c) Given the values in matrix  $B$  for part (a), find the value of  $B(2:-1:1, [3,1])$

```
ans =
     0    1.0000
     0    2.7183
```

Explanation: The first index refers to row numbers, and the second index refers to

columns:  $([2,1],[3,1]) = \begin{matrix} \underline{3} & \underline{1} \\ 2 | & (2,3) & (2,1) \\ 1 | & (1,3) & (1,1) \end{matrix}$  so

$$B([2,1],[3,1]) = \begin{bmatrix} B(2,3) & B(2,1) \\ B(1,3) & B(1,1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & e \end{bmatrix}$$

5. Write the exact code you would enter at the command prompt in Matlab® to compute the following quantity:

$$\cos(140^3) + j\pi$$

`cos(140^3)+j*pi`

6. Write down a one-line Matlab® command using a colon to create the following array:

`[1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7]`

`1./(1:7)`