

Array Practice Sheet

1. Write down the array produced by each expression listed below. You cannot use MATLAB to solve this problem, you must do this calculation by hand.

$$A = \begin{bmatrix} 7 & 4 & 11 & -3 & 2 \\ 2 & 6 & -2 & 52 & 6 \\ 7 & 4 & 11 & -3 & -2 \\ 4 & 77 & 1 & 8 & 52 \\ 7 & 5 & 9 & 22 & 7 \\ 3 & 4 & 67 & 3 & 4 \\ 7 & 4 & 11 & -3 & 11 \end{bmatrix}$$

- a. $A(1:3, 2:4)$
- b. $A(2:3, 4)$
- c. $A(1:2, 1:2) - A(4:5, 2:3)$
2. Now check your answers in MATLAB.
3. Create the following arrays from the above array
 $x = A(1:3, 2:4)$ $y = A(3:5, 1:3)$
- Complete the following element-by-element calculations in MATLAB:
- a. $xy =$
- b. $\frac{x}{y} =$
- c. $x^3 =$
- d. $\frac{4y + 3x}{2x} =$
4. Determine what the following functions do when applied to a matrix (e.g., were $M = x$ or y above):
 $\text{size}(M)$, $\text{max}(M)$, $\text{min}(M)$, $\text{sum}(M)$, $\text{abs}(M)$
5. Calculate the magnitude of row one of x

Array Practice Sheet (Solution)

1. Write down the array produced by each expression listed below. You cannot use MATLAB to solve this problem, you must do this calculation by hand..

a. $A(1:3, 2:4) =$

$$\begin{bmatrix} 4 & 11 & -3 \\ 6 & -2 & 52 \\ 4 & 11 & -3 \end{bmatrix}$$

b. $A(2:3, 4) =$

$$\begin{bmatrix} 52 \\ -3 \end{bmatrix}$$

c. $A(1:2, 1:2) - A(4:5, 2:3) =$

$$\begin{bmatrix} 7 & 4 \\ 2 & 6 \end{bmatrix} - \begin{bmatrix} 77 & 1 \\ 5 & 9 \end{bmatrix} = \begin{bmatrix} -70 & 3 \\ -3 & -3 \end{bmatrix}$$

2. Now check your answers in MATLAB.

Enter the array A

```
>> A = [7 4 11 -3 2; 2 6 -2 52 6; 7 4 11 -3 -2; 4 77 1 8 52; 7 5 9 22 7; 3 4 67 3 4; 7 4 11 -3 11]
```

Then enter the expressions as shown in problem 1 above.

3. Create the following arrays

$$x = A(1:3, 2:4) \quad y = A(3:5, 1:3)$$

$$x = \begin{bmatrix} 4 & 11 & -3 \\ 6 & -2 & 52 \\ 4 & 11 & -3 \end{bmatrix} \quad y = \begin{bmatrix} 7 & 4 & 11 \\ 4 & 77 & 1 \\ 7 & 5 & 9 \end{bmatrix}$$

Complete the following element-by-element calculations in MATLAB:

a. $xy =$

```
x.*y
ans =
    28    44   -33
    24  -154    52
    28    55   -27
```

c. $x^3 =$

```
>> x.^3
ans =
    64    1331   -27
   216     -8  140608
    64    1331   -27
```

b. $\frac{x}{y} =$

```
x./y
ans =
    0.5714    2.7500   -0.2727
    1.5000   -0.0260   52.0000
    0.5714    2.2000   -0.3333
```

d. $\frac{4y + 3x}{2x} =$

```
>> (4*y + 3*x)./(2*x)
ans =
    5.0000    2.2273   -5.8333
    2.8333  -75.5000    1.5385
    5.0000    2.4091   -4.5000
```

e. Magnitude of row 1 of x

```
>> sqrt(sum(x(1,:).^2))
ans =
```

12.0830

4. Determine what the following functions do when applied to a matrix (e.g., were $M = x$ or y above):
`size(M)`, `max(M)`, `min(M)`, `sum(M)`, `abs(M)`

`size(M)` → returns a vector indicating the size of the array rows x columns

`max(M)` → returns a vector of the maximum of each column

`min(M)` → returns a vector of the minimum of each column

`sum(M)` → returns a vector of the summation of each column

`abs(M)` → returns an array the same dimensions as the initial array with the absolute value of each real element. Complex elements are replaced by their magnitude.

5. Calculate the magnitude of row one of x

```
>> sqrt(sum(x(1,:).^2))  
ans =  
12.0830
```