CE311K – McKinney
Homework 7

Arrays

Problem 1. Text Problem 4, Sec 7.1, page 310

```
3
7
0
```

Problem 2. Text Problem 8, Sec 7.1, page 3111

```
10
12
3
14
```

Problem 3. Text Problem 20, Sec 7.1, page 314

```
cat(0)     cat(1)     cat(2)     cat(3)
Felix      Garfield   Morris     Socks

cat(0)     cat(1)     cat(2)     cat(3)
Felix      Garfield   Morris     Socks
```

Problem 4. Text Problem 30, Sec 7.1, page 316

```
Dim total As Double
total = 0
For i As Integer = 0 To 20
  total = total + p(i) * q(i)
Next
```

Problem 5. Text Problem 4, Sec 7.2, page 328

```
The sum of the 5 numbers is 30
```

Matrices

Problem 6. When addition is defined, add the matrices A and B in the following cases:

a. $\mathbf{A} = \begin{bmatrix} 3 & 4 & 5 \\ 2 & 1 & 6 \end{bmatrix} \qquad \boldsymbol{B} = \begin{bmatrix} 9 & 7 & 2 \\ 0 & 1 & 8 \end{bmatrix}$

$$\mathbf{A} + \mathbf{B} = \begin{bmatrix} 3 & 4 & 5 \\ 2 & 1 & 6 \end{bmatrix} + \begin{bmatrix} 9 & 7 & 2 \\ 0 & 1 & 8 \end{bmatrix} = \begin{bmatrix} 12 & 11 & 9 \\ 2 & 2 & 14 \end{bmatrix}$$

b. $\boldsymbol{A} = \begin{bmatrix} 3 & 2 \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} 4 \\ 6 \end{bmatrix}$

$\boldsymbol{A}$ + $\boldsymbol{B}$ Undefined

c. $\boldsymbol{A} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$

$$\mathbf{A} + \mathbf{B} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} + \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix} = \begin{bmatrix} 11 \\ 13 \\ 15 \end{bmatrix}$$

d. $\boldsymbol{A} = \begin{bmatrix} 0 & 1 \\ 0 & 6 \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} 7 & 4 \\ 1 & 0 \end{bmatrix}$

$$\mathbf{A} + \mathbf{B} = \begin{bmatrix} 0 & 1 \\ 0 & 6 \end{bmatrix} + \begin{bmatrix} 7 & 4 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 7 & 5 \\ 1 & 6 \end{bmatrix}$$

Problem 7. Find the products $\boldsymbol{AB}$:

a. $\boldsymbol{A} = \begin{bmatrix} 1 & 2 & 4 & 5 \\ 3 & 1 & 0 & 2 \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} 1 \\ 4 \\ 8 \\ 9 \end{bmatrix}$

$$\boldsymbol{AB} = \begin{bmatrix} 1 & 2 & 4 & 5 \\ 3 & 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 4 \\ 8 \\ 9 \end{bmatrix} = \begin{bmatrix} 1*1+2*4+4*8+5*9 \\ 3*1+1*4+0*8+9*2 \end{bmatrix} = \begin{bmatrix} 86 \\ 25 \end{bmatrix}$$

b. $\boldsymbol{A} = \begin{bmatrix} 1 \\ 0 \\ 7 \\ 8 \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} 2 & 4 & 9 & 6 & 5 & 0 \end{bmatrix}$

$$\mathbf{AB} = \begin{bmatrix}1\\0\\7\\8\end{bmatrix}\begin{bmatrix}2 & 4 & 9 & 6 & 5 & 0\end{bmatrix} = \begin{bmatrix}2 & 4 & 9 & 6 & 5 & 0\\0 & 0 & 0 & 0 & 0 & 0\\14 & 28 & 63 & 42 & 35 & 0\\16 & 32 & 72 & 48 & 40 & 0\end{bmatrix}$$

c. $\boldsymbol{A} = \begin{bmatrix}3 & 1\\2 & 4\\5 & 6\end{bmatrix} \qquad \boldsymbol{B} = \begin{bmatrix}1\\2\end{bmatrix}$

$$\mathbf{AB} = \begin{bmatrix}3 & 1\\2 & 4\\5 & 6\end{bmatrix}\begin{bmatrix}1\\2\end{bmatrix} = \begin{bmatrix}5\\10\\17\end{bmatrix}$$

Problem 8. Given the diagonal matrices ***A*** and ***B***, compute ***AB*** and ***BA***.

$$\boldsymbol{A} = \begin{bmatrix}a_{11} & 0 & 0 & 0 & 0\\0 & a_{22} & 0 & 0 & 0\\0 & 0 & a_{33} & 0 & 0\\0 & 0 & 0 & \ddots & 0\\0 & 0 & 0 & 0 & a_{nn}\end{bmatrix} \quad \boldsymbol{B} = \begin{bmatrix}b_{11} & 0 & 0 & 0 & 0\\0 & b_{22} & 0 & 0 & 0\\0 & 0 & b_{33} & 0 & 0\\0 & 0 & 0 & \ddots & 0\\0 & 0 & 0 & 0 & b_{nn}\end{bmatrix}$$

$$\mathbf{AB} = \mathbf{BA} = \begin{bmatrix}a_{11} & 0 & 0 & 0 & 0\\0 & a_{22} & 0 & 0 & 0\\0 & 0 & a_{33} & 0 & 0\\0 & 0 & 0 & \ddots & 0\\0 & 0 & 0 & 0 & a_{nn}\end{bmatrix}\begin{bmatrix}b_{11} & 0 & 0 & 0 & 0\\0 & b_{22} & 0 & 0 & 0\\0 & 0 & b_{33} & 0 & 0\\0 & 0 & 0 & \ddots & 0\\0 & 0 & 0 & 0 & b_{nn}\end{bmatrix}$$

$$= \begin{bmatrix}a_{11}b_{11} & 0 & 0 & 0 & 0\\0 & a_{22}b_{22} & 0 & 0 & 0\\0 & 0 & a_{33}b_{33} & 0 & 0\\0 & 0 & 0 & \ddots & 0\\0 & 0 & 0 & 0 & a_{nn}b_{nn}\end{bmatrix}$$

Problem 9. Given the matrices

$$\mathrm{X} = \begin{bmatrix}1 & 6\\3 & 10\\7 & 4\end{bmatrix} \qquad \mathrm{Y} = \begin{bmatrix}6 & 0\\1 & 4\end{bmatrix} \qquad \mathrm{Z} = \begin{bmatrix}1 & 1\\6 & 8\end{bmatrix}$$

Show that ***Y*Z*** is not equal to ***Z*Y***

Problem 10. If $A = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, then $C = \begin{bmatrix} 17 & 16 \\ 7 & 6 \end{bmatrix}$ denotes the

a) _____ sum of A and B;

b) _____ difference of A and B;

c) _X___ product of A and B;

d) ____ none of the above