

Module 02: Vectors and Matrices

Chul Min Yeum

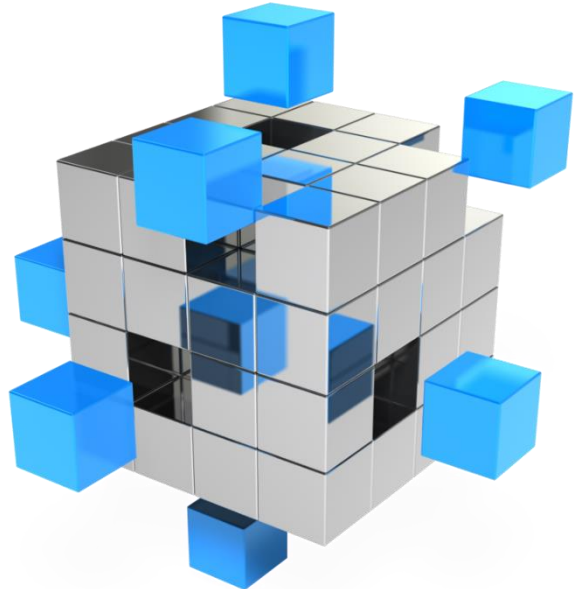
Assistant Professor

Civil and Environmental Engineering

University of Waterloo, Canada



UNIVERSITY OF WATERLOO
FACULTY OF ENGINEERING



Given code

```
rvec = [1 2 3 4];  
cvec = [5; 6; 7; 8];
```



(a) `a = rvec(5)`

(b) `cvec(5) = 10`

(c) `cvec(2:4) = rvec`

(d) `a = [rvec cvec']`

(e) `b = rvec(2:5)`

```
rvec = [1 2 3];
```

```
col = [5; 6];
```

```
mat1 = [rvec; [4, col']]
```

```
mat2 = [rvec; [4; col]]'
```

```
mat3 = [[1;4] [2;5] [3;6]]
```

```
mat4 = [1 2; 3 4; 5 6]
```



```
mat1 = [1 2 3 4; 5 6 7 8];
```

```
mat1 = mat1';
```

```
mat1(:, 1) = mat1(:, 2);
```

```
mat1([1 2], :) = mat1([2 1], :);
```

```
mat1(:, end) = 10;
```



| | |
|---|----|
| 6 | 10 |
| 5 | 10 |
| 7 | 10 |
| 8 | 10 |

(a)

| | |
|----|----|
| 10 | 10 |
| 3 | 4 |
| 5 | 6 |
| 7 | 8 |

(b)

| | |
|----|----|
| 10 | 6 |
| 10 | 15 |
| 10 | 7 |
| 10 | 8 |

(c)

| | |
|----|----|
| 1 | 5 |
| 2 | 6 |
| 3 | 7 |
| 10 | 10 |

(d)

```
A = [1 2 3];
```

```
B = [4;5;6;7];
```

```
C = [1 2 3 4; 4 5 6 7; 7 8 9 10];
```



(a) `mat1 = C*A;`

(b) `mat2 = C*B;`

(c) `mat3 = B*C;`

(d) `mat4 = A*C;`

(e) `mat5 = A*B;`

```
mat1 = [1 2 3 4; 5 6 7 8];  
rvec = [1 2 3]
```

```
mat1 = mat1';  
mat1(rvec,:) = 2;  
mat1(rvec) = 3;  
mat1(end,:) = [];
```



```
n = 5;  
v1 = (1:n) .* (1:n);  
v2 = n:-1:1;  
v3 = 1:2:n;  
vec1 = [v1 v2 v3];
```



(A) [1 2 3 4 5 5 4 3 2 1 1 3 5]

(B) [1 4 6 8 10 5 4 3 2 1 2 4]

(C) [1 4 9 16 25 1 2 3 4 5 2 4]

(D) [1 4 9 16 25 5 4 3 2 1 1 3 5]

```
v1 = [49 50 49];  
v2 = 'CIVE';  
v3 = 121;  
v4 = [67 73 86 69];  
v5 = '121';
```

| Dec | Char |
|-----|------|
| 48 | 0 |
| 49 | 1 |
| 50 | 2 |
| 51 | 3 |
| 52 | 4 |
| 53 | 5 |
| 54 | 6 |
| 55 | 7 |
| 56 | 8 |
| 57 | 9 |

| Dec | Char |
|-----|------|
| 65 | A |
| 66 | B |
| 67 | C |
| 68 | D |
| 69 | E |
| 70 | F |
| 71 | G |
| 72 | H |
| 73 | I |
| 74 | J |
| 75 | K |
| 76 | L |
| 77 | M |
| 78 | N |
| 79 | O |
| 80 | P |
| 81 | Q |
| 82 | R |
| 83 | S |
| 84 | T |
| 85 | U |
| 86 | V |
| 87 | W |
| 88 | X |
| 89 | Y |
| 90 | Z |

| Dec | Char |
|-----|------|
| 97 | a |
| 98 | b |
| 99 | c |
| 100 | d |
| 101 | e |
| 102 | f |
| 103 | g |
| 104 | h |
| 105 | i |
| 106 | j |
| 107 | k |
| 108 | l |
| 109 | m |
| 110 | n |
| 111 | o |
| 112 | p |
| 113 | q |
| 114 | r |
| 115 | s |
| 116 | t |
| 117 | u |
| 118 | v |
| 119 | w |
| 120 | x |
| 121 | y |
| 122 | z |

(a)

```
[v2 v5]
```

(b)

```
[char(v4) v3]
```

(c)

```
char([v4 v1])
```

(d)

```
[v2 char(v3)]
```




```
char_vec_org = 'ehs';  
char_d = double(char_vec_org);  
char_d = char_d + [-2 1 3];  
  
char_vec = char(char_d);  
char_vec(end+1) = 'e';
```



M02-Q1: Which of the following scripts have errors?

Given code

```
rvec = [1 2 3 4];  
cvec = [5; 6; 7; 8];
```



- (a) `a = rvec(5)`
- (b) `cvec(5) = 10`
- (c) `cvec(2:4) = rvec`
- (d) `a = [rvec cvec']`
- (e) `b = rvec(2:5)`

M02-Q2: Which of a matrix has a different value compared to the other three?

```
rvec = [1 2 3];  
col = [5; 6];  
  
mat1 = [rvec; [4, col']]  
mat2 = [rvec; [4; col]]'  
mat3 = [[1;4] [2;5] [3;6]]  
mat4 = [1 2; 3 4; 5 6]
```

M02-Q3: What value is assigned to *mat1*?

```
mat1 = [1 2 3 4; 5 6 7 8];  
mat1 = mat1';  
mat1(:, 1) = mat1(:, 2);  
mat1([1 2], :) = mat1([2 1], :);  
mat1(:, end) = 10;
```



| | |
|---|----|
| 6 | 10 |
| 5 | 10 |
| 7 | 10 |
| 8 | 10 |

(a)

| | |
|----|----|
| 10 | 10 |
| 3 | 4 |
| 5 | 6 |
| 7 | 8 |

(b)

| | |
|----|----|
| 10 | 6 |
| 10 | 15 |
| 10 | 7 |
| 10 | 8 |

(c)

| | |
|----|----|
| 1 | 5 |
| 2 | 6 |
| 3 | 7 |
| 10 | 10 |

(d)

**M02-Q4: Which of the following scripts have
NO errors?**

```
A = [1 2 3];  
B = [4;5;6;7];  
C = [1 2 3 4; 4 5 6 7; 7 8 9 10];
```



(a) `mat1 = C*A;`

(b) `mat2 = C*B;`

(c) `mat3 = B*C;`

(d) `mat4 = A*C;`

(e) `mat5 = A*B;`

M02-Q5: What is a value at *mat1(4)* after executing this script?

```
mat1 = [1 2 3 4; 5 6 7 8];  
rvec = [1 2 3]
```

```
mat1 = mat1';  
mat1(rvec,:) = 2;  
mat1(rvec) = 3;  
mat1(end,:) = [];
```

M02-Q6: : What is the array finally assigned to *vec1*?

```
n = 5;  
v1 = (1:n) .* (1:n);  
v2 = n:-1:1;  
v3 = 1:2:n;  
vec1 = [v1 v2 v3];
```



- (A) [1 2 3 4 5 5 4 3 2 1 1 3 5]
- (B) [1 4 6 8 10 5 4 3 2 1 2 4]
- (C) [1 4 9 16 25 1 2 3 4 5 2 4]
- (D) [1 4 9 16 25 5 4 3 2 1 1 3 5]

M02-Q7: Which of the following scripts generating 'CIVE121'?

```
v1 = [49 50 49];  
v2 = 'CIVE';  
v3 = 121;  
v4 = [67 73 86 69];  
v5 = '121';
```

| Dec | Char |
|-----|------|
| 48 | 0 |
| 49 | 1 |
| 50 | 2 |
| 51 | 3 |
| 52 | 4 |
| 53 | 5 |
| 54 | 6 |
| 55 | 7 |
| 56 | 8 |
| 57 | 9 |

| Dec | Char |
|-----|------|
| 65 | A |
| 66 | B |
| 67 | C |
| 68 | D |
| 69 | E |
| 70 | F |
| 71 | G |
| 72 | H |
| 73 | I |
| 74 | J |
| 75 | K |
| 76 | L |
| 77 | M |
| 78 | N |
| 79 | O |
| 80 | P |
| 81 | Q |
| 82 | R |
| 83 | S |
| 84 | T |
| 85 | U |
| 86 | V |
| 87 | W |
| 88 | X |
| 89 | Y |
| 90 | Z |

| Dec | Char |
|-----|------|
| 97 | a |
| 98 | b |
| 99 | c |
| 100 | d |
| 101 | e |
| 102 | f |
| 103 | g |
| 104 | h |
| 105 | i |
| 106 | j |
| 107 | k |
| 108 | l |
| 109 | m |
| 110 | n |
| 111 | o |
| 112 | p |
| 113 | q |
| 114 | r |
| 115 | s |
| 116 | t |
| 117 | u |
| 118 | v |
| 119 | w |
| 120 | x |
| 121 | y |
| 122 | z |

- (a)
- (b)
- (c)
- (d)



M02-Q8: Find a character vector assigned to *char_vec*.

```
char_vec_org = 'ehs';  
char_d = double(char_vec_org);  
char_d = char_d + [-2 1 3];  
  
char_vec = char(char_d);  
char_vec(end+1) = 'e';
```