COS125 - Precept 7 (Arrays II)

1 Code Tracing

Please draw diagrams that represent what the following code is doing.

```
int[] a = new int[4];
int[] b = new int[4];
System.out.println(a == b);
```

```
b = a;
System.out.println(a == b);
```

```
a[2] = 125;
System.out.println(a[2] + ", " + b[2]);
```

```
b = new int[5];
System.out.println(a[2] + ", " + b[2]);
```

2 Generate Deck

Please write a program `GenerateDeck.java` that takes one `int` command-line argument `numCards`. The program then:

- Initializes a deck of `numCards`. Represent each card as a string, using one character for the rank (`2`, `3`, ..., `9`, `T`, `J`, `Q`, `K`, `A`) followed by one for the suit (`C`, `D`, `H` or `S`).
- Prints the result.

3 Matrix Transpose

Please write a program `MatrixTranspose.java` that starts out with the following 3×3 matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

and transposes it, obtaining the result

$$A^T = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}.$$

Notice that, to transpose a matrix, you reflect the matrix along its diagonal. Equivalently, you can write the rows of the original matrix as columns.

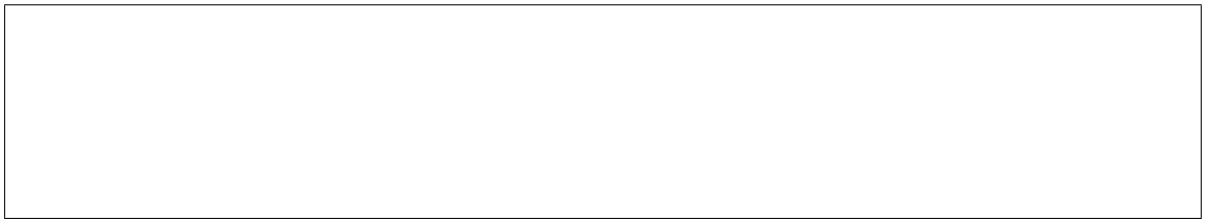
More concretely, the element at row i and column j in matrix A^T corresponds to element at row j and column i in matrix A. Formally,

$$[A^T]_{ij} = [A]_{ji}.$$

4 Bonus: More Code Tracing

Please draw diagrams that represent what the following code is doing.

```
int[] a = { 2, 3, 4, 5, 6, 7, 8, 9 };
int n = a.length;
int[] copy = new int[n];
```



```
for (int i = 0; i < n; i++) {
    if (i % 2 == 0) copy[i] = a[i / 2];
    else copy[i] = a[(i + n - 1) / 2];
}
```