Running Head: 2D-Data Twirl Henry Page 1

**Introduction**

In this program, the problem comes forth that images created by a 2D array must be flipped 90 degrees, 180 degrees, and 270 degrees. In order to flip the images, there are 3 functional requirements that must be met. The first is that the image must be flipped 90 degrees, printing as if it were shifted counterclockwise. The second functional requirement is the image must be printed 180 degrees, or upside-down and flipped. The third functional requirement is that the image must be printed rotated 270 degrees, counterclockwise once again. These three functional requirements, when met, will produce a solution to the presented problem.

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| **ID** |  | **Functional Requirement** |  | **Value** | **Stakeholder** |
| FID002 | **I want to** | Print the images rotated 90 degrees | **so that** | The images show up on the console in the proper orientation | instructor |
| FID003 | **I want to** | Print the images rotated 180 degrees | **so that** | The image is upside down from the original image when printed | instructor |
| FID004 | **I want to** | Print the images rotated 270 degrees | **so that** | The images show up on the console in the proper orientation | instructor |

**Analysis**

For this problem, the task at hand becomes more simpler when the initial step is to transpose the original array. Doing this allows each row and column in the array to be flipped, and stored into a temporary space. When this array is flipped, it becomes possible to iterate through each element of the array and produce an image with System.out.println() that has been flipped 90 degrees. In order to fulfill functional requirement 2, all that needs to be done is iterate through each member of the original array backwards, using System.out.printl() this will produce an image that matches the upside-down image of the functional requirement. For the third functional requirement, a combination of techniques for the first and second functional requirement is used. Iterating backwards through the transposed array will yield an image that has been rotated 270 degrees counterclockwise.

**Conclusion**

When a user runs this program, they can expect that it will produce an image being flipped in 90-degree intervals for 270 degrees. Each function that has been made creates a 90-degree flip, which fulfills the functional requirements of the program.

The final product of this assignment was way easier than I was making it out to be. That seems to be a common trend, is I think there is some fancy built-in that I don’t know about that will really help with these kinds of problems, but going through the simplest solution seems to be what all of the assignments up to this point have been. The difficulties that I’m having are looking at things with too narrow of a lens, I need to be broader with my approaches and not be obsessive about one idea that I have and thinking that it’s going to work. Unfortunately, that’s a lot easier said than done, and it will take some practice, so please have some patience.