Ahmad Soboh, Tausif Islam

SEG2105 Assignment 1

E26:

Design Alternatives	Pros	Cons
Design 1	Uses only 1 set of instance variables saving memory, straightforward	Converting between coordinate types involves additional computation, as you need to calculate the missing coordinate when switching types As well, repeated conversions cause rounding errors.
Design 2	The class only needs to handle one coordinate type, which simplifies the implementation, and there is no need for 2 conversion methods	Restricts the class to handling only polar coordinates
Design 3	The class only needs to handle one coordinate type, which simplifies the implementation, and there is no need for 2 conversion methods	Restricts the class to handling only cartesian coordinates
Design 4	The class can handle both cartesian and polar coordinates, making it good for various use cases	Requires you to dedicate memory for 4 instance variables, using up memory.
Design 5	Allows easy manipulation to design, allowing subclasses to be used to specialize each coordinate calculation.	More complex to build, using a hierarchy and causes duplicate code bases

E28:

Sample Size of 10 Runs with an Array Size of 80,000,000 (Chosen as run time 10s of Design 1)

Design	Max Time Result	Min Time Result	Avg Time Result
Design 2	8690	8447	8503.7
Design 3	7430	7370	7393.2
Design 5	6689	6494	6555.0

Magnitude of difference and is the hypothesis developed in E26 correct:

Sample Size of 10 runs for part 2b:

	Maximum Time To Sum (ms)	Minimum Time To Sum (ms)	Avg Time To Sum (ms)
Array List	167	68	93.7
Vector Array	1569	1124	1435.7
Normal Array	164	42	66

When we inserted and summed up elements in collections like vectors, arraylists, and normal arrays, we made some conclusions. It took us around 5 seconds to create the array list, then we saw a recurring occurrence of the normal array always being the quickest. The normal array was quicker inserting elements and iterating through as well as summing up each element at its index. Although the Normal Array performed the best, I recommend that designers should choose the approach that best satisfies their unique requirements.