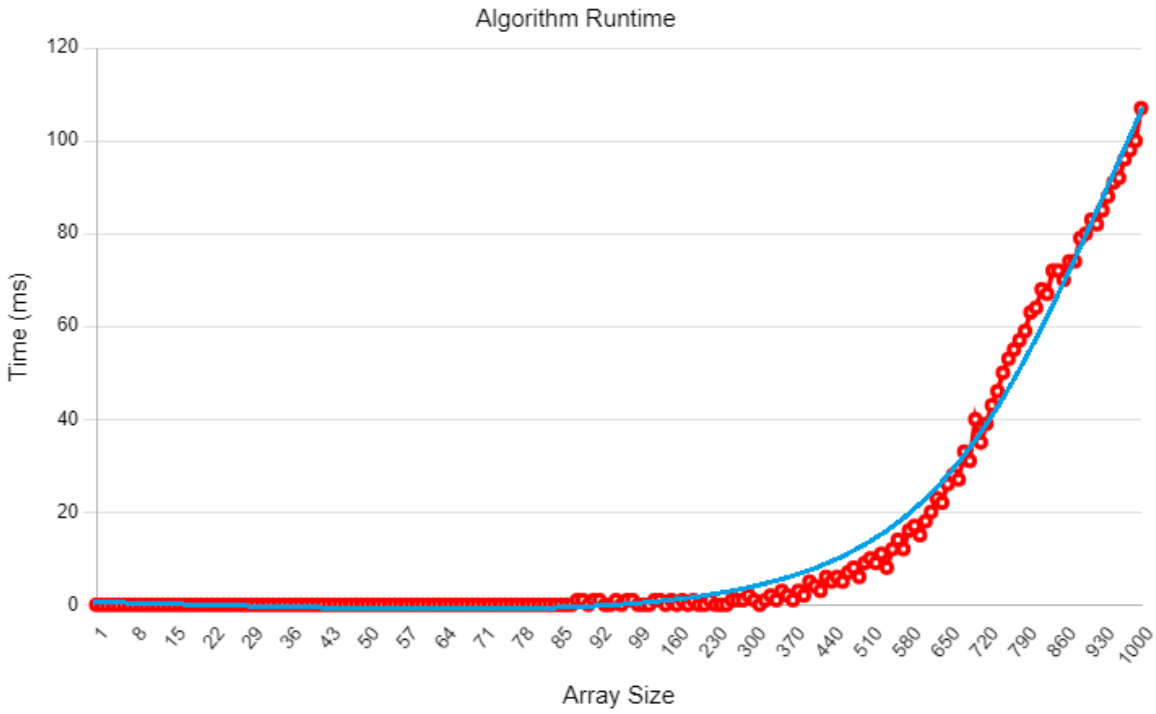
1. $T(n)$ = $^{n}\sum_{i=1}$ $^{n}\sum_{j=1}$ (1) = $^{n}\sum_{i=1}$ (n) = n * $^{n}\sum_{i=1}$ (1) = n * n = n^2

2.

Red = Data Points **Blue = Fitted Curve**



3.

Since the fitted curve is a polynomial, we will assume that T(n) = $an^2 + bn + c$.

Upper Bound: $an^2 + bn + c$
Lower Bound: n^2

Big O Notation - $O(n^2)$
Big Ω Notation - $\Omega(n^2)$
Big Θ Notation - $\Theta(n^2)$

4. Yes, the runtime will increase. The y = 1 outside the loops will make no difference, but the added statement y = i + j will approximately double the runtime, as in practice, this doubles the runtime from about n^2 to about $2n^2$.

5. No. Despite the fact that the runtime has increased in practice, we ignore all constants in theory, so our runtime is still $O(n^2)$.