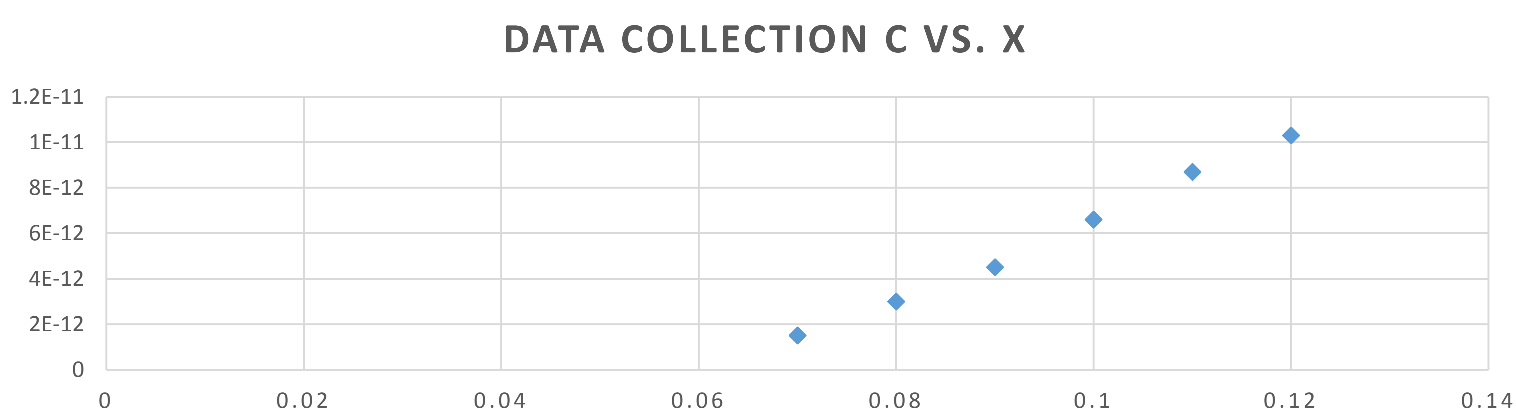
Measurement of the Electric Permittivity of Free Space

DATA	Distance (meters) x	Capacitance (PicoFarads) y	x = 1/Distance	y = C/Area
	0.07	1.5E-12	14.28571429	1.911E-10
	0.08	3E-12	12.5	3.822E-10
	0.09	4.5E-12	11.11111111	5.732E-10
	0.1	6.6E-12	10	8.408E-10
	0.11	8.7E-12	9.090909091	1.108E-09
	0.12	1.03E-11	8.333333333	1.312E-09

Measured Electric Permittivity ->	8.99333E-12	Percent Difference =	0.02	%
Theoretical Constant ->	8.85419E-12	t =	0.006909124	

LINEST OUTPUT			
Slope ->	-1.89673E-10	2.79955E-09	<- y intercept
Uncertainty ->	2.01387E-11	2.23027E-10	<- uncrt of y-int
R^2 ->	0.956852562	1.00163E-10	<- Variance
Fisher ->	88.70538797	4	
	8.89941E-19	4.01302E-20	



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A.1 Yes, the slope is very close to the theoretical constant. A difference of 0.2% - 0.02% difference I would say is within a reasonable tolerance.

A.2 I would assert that averaging out the distance/capacitance measurement would eliminate most human error. I would further hypothesize that a “constant” source of environmental electro-magnetic “noise” could be a source of random error. This “noise” could originate from over head lighting or humans. I do believe that this is a reasonable way to **demonstrate** the permittivity constant but an electro-magnetically shielded room that is able to create a vacuum would be a better place to do precise measurements.

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