Measurement of the Electric Permittivity of Free Space

DATA	Capacitance (F) x	Plate Seperation (m) y	x = 1/Distance	y = C/Area
	1.1E-10	0.003	333.3333333	3.54839E-09
	8.52E-11	0.004	250	2.74839E-09
	7.22E-11	0.005	200	2.32903E-09
	6.16E-11	0.006	166.6666667	1.9871E-09
	5.49E-11	0.007	142.8571429	1.77097E-09
	4.96E-11	0.008	125	1.6E-09
	4.56E-11	0.009	111.1111111	1.47097E-09
	4.23E-11	0.01	100	1.36452E-09
	3.98E-11	0.011	90.90909091	1.28387E-09
	3.75E-11	0.012	83.33333333	1.20968E-09
	3.56E-11	0.013	76.92307692	1.14839E-09

Measured Electric Permitivity ->	**9.34141E-12**	Percent Difference =	0.06	%
Theoretical Constant ->	**8.85419E-12**	t =	10.63778965	

LINEST OUTPUT			
Slope ->	9.34141E-12	4.33315E-10	<- y intercept
Uncertainty ->	4.58016E-14	7.82284E-12	<- uncert of y-int
R^2 ->	0.999783686	1.16115E-11	<- Variance
Fisher ->	41597.27035	9	
	5.60843E-18	1.21344E-21	

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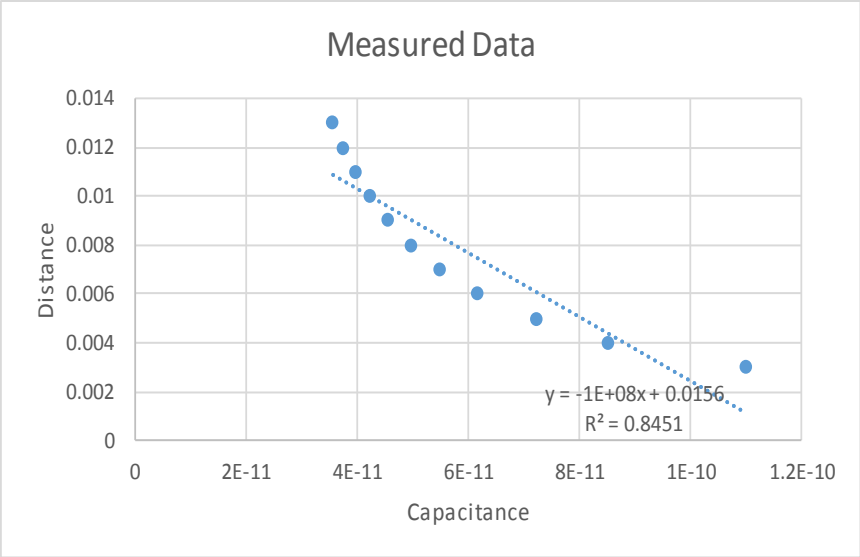

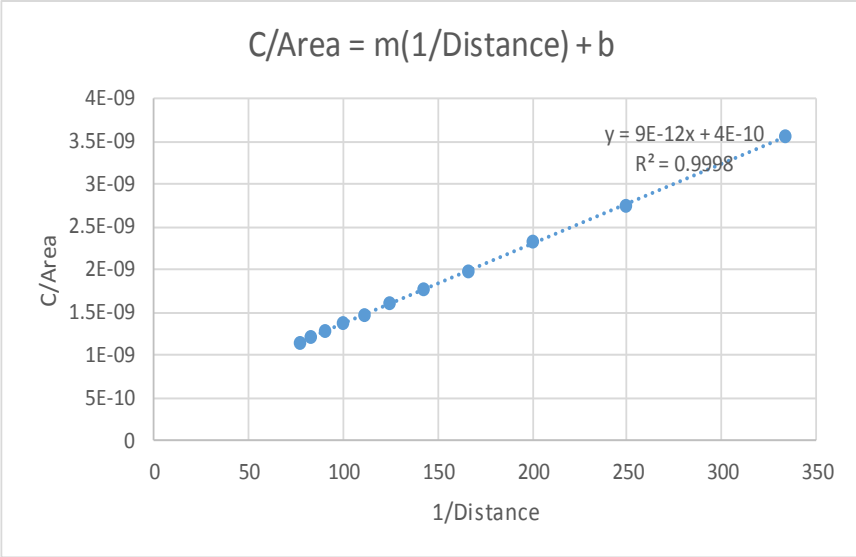

A.1 Yes, the slope is very close to the theoretical constant. A difference of 0.6% I would say is within a reasonable tolerance.

A.2 I would assert that averaging out the distance/capacitance measurement would minimize 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 good way to **demonstrate** the permittivity constant but an electro-magnetically shielded room that is able to create a vacuum would be an optimal place to do precise measurements.

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