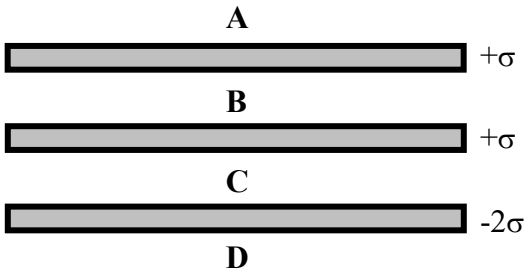
Physics 4B
Fall 2022

Name: _____

Lab (circle one): 8:00 am 11:15 am 2:30 pm

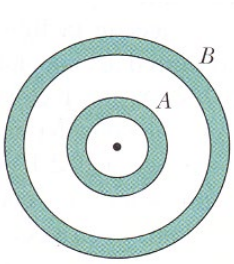
Quiz #3: Gauss' Law

Problem 1 (2 points)
The figure shows sections of three *infinite nonconducting sheets* with uniform surface charge densities of either $+\sigma$ or -2σ as indicated. In which region (A, B, C, or D) is the magnitude of the electric field the greatest? What is that magnitude?



a) region **B**: $E = \sigma/\varepsilon_0$
b) region **B**: $E = 2\sigma/\varepsilon_0$
c) region **C**: $E = 2\sigma/\varepsilon_0$
d) region **C**: $E = 4\sigma/\varepsilon_0$
e) none of the above

Problem 2 (3 points)
A particle of charge q = -25 μC is at the center of two concentric conducting spherical shells as shown in the figure below. Shell A has a net charge of +10 μC and shell B has a charge of -35 μC. What is the charge on the inner and outer surfaces of each shell?



	Inner surface	Outer surface
Charge on shell A:		
Charge on shell B:		

Problem 3 (5 points)
A very long, solid conducting cylinder has a radius of 5.0 cm and charge density is $\lambda = 1.80$ nC/m. Point A is 12.0 cm from the central axis of the cylinder and point B is 4.0 cm from the central axis of the cylinder. Use Gauss' law to find the electric field (magnitude and direction) at points A and B.

Note: You must show all work starting with the expression for Gauss' Law.