MD11-2

$\nabla^2 V = 0$

Suppose that applying boundary conditions to Laplace's equation leads to an equation of the form:

$$\sum_{l=0}^{\infty} C_l P_l(\cos\theta) = 4 + 3\cos\theta$$

$(x \equiv \cos\theta)$

$P_0(x) = 1$

$P_1(x) = x$

$P_2(x) = (3x^2 - 1)/2$

Can you solve for the coefficients, the C_l's ?

A) No, you need at least one more equation to solve for any the C's.
B) Yes, you have enough info to solve for all of the C's
C) Partially. Can solve for C_0 and C_1, but cannot solve for the other C's.
D) Partially. Can solve for C_o, but cannot solve for the other C's.

3.19a

$P_0(\cos\theta) = 1,$ $\quad P_1(\cos\theta) = \cos\theta$

$P_2(\cos\theta) = \frac{3}{2}\cos^2\theta - \frac{1}{2},$ $\quad P_3(\cos\theta) = \frac{5}{2}\cos^3\theta - \frac{3}{2}\cos\theta$

Can you write the function $\sin^2\theta$ as a sum of Legendre Polynomials?

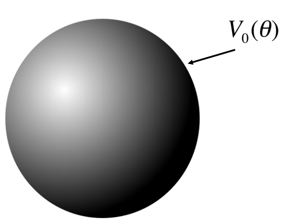
$$\sin^2\theta \overset{???}{=} \sum_{l=0}^{\infty} C_l P_l(\cos\theta)$$

A) No, it cannot be done
B) Yes, It would require an infinite sum of terms
C) Yes, only C_2 would be nonzero
D) Yes, but only C_0 and C_2 would be nonzero
E) Something else/none of the above

3.20

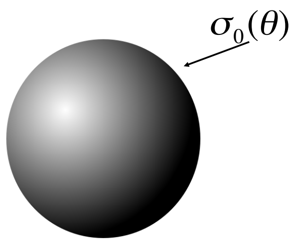
How many boundary conditions (on the potential V) do you use to find V inside the spherical plastic shell?

A) 1
B) 2
C) 3
D) 4
E) It depends on $V_0(\theta)$



3.21

How many boundary conditions (on the potential V) do you use to find V inside the thin plastic spherical shell?



A) 1
B) 2
C) 3
D) 4
E) depends on σ_0

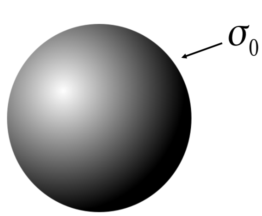
3.21 b

Does the previous answer change at all if you're asked for V *outside* the sphere?

a) yes

b) No

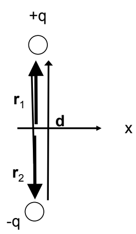
Since the electric field is zero inside this conducting sphere, and $V = -\int \vec{E} \cdot d\vec{l}$, is V=0 inside as well?



a) Yes

b) No

MD6.1



$$\sum_i q_i \vec{r}_i = ?$$

A) $+q\vec{d}$

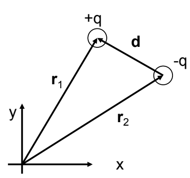
B) $+2q\vec{d}$

C) $-2q\vec{d}$

D) zero

E) None of these

MD6.1



$$\sum_i q_i \vec{r}_i = ?$$

A) $+q\vec{d}$

B) $+2q\vec{d}$

C) $-2q\vec{d}$

D) zero

E) None of these