Module 03 Baseline Quiz

Read sections 6.1 - 6.4

1. What is electric flux?
   a) Conceptually, it is the number of electric field lines that pass through a surface.
   b) Conceptually, it is the number of electric field lines that pass through a volume.
   c) Conceptually, it is the number of electric field lines that terminate inside a volume.
   d) Conceptually, it is the number of electric field lines that originate inside a volume.
   e) None of the above.
2. What direction does the area vector point for a flat surface?
   a) It points parallel to the plane of the surface.
   b) It points perpendicular to the plane of the surface.
   c) It points in the direction that the electric field vector at the position of the surface points.
   d) None of the above.
3. What is the magnitude of the area vector for a flat surface?
   a) The magnitude is equal to the electric field strength multiplied by the area of the surface.
   b) The magnitude is equal to the charge producing the field lines that pass through the surface.
   c) The magnitude is equal to the area of the surface.
   d) None of the above.
4. How is the electric flux through a non-flat surface calculated?
   a) The electric flux will be the derivative of the electric potential along the surface.
   b) We break the surface up into small, approximately flat, surfaces, calculate the flux through each surface, and add them together.
   c) We break the surface up into small, approximately flat, surfaces, calculate the flux through each surface, and multiply them together.
   d) The electric flux will be the integral of the electric potential along the surface.
   e) None of the above.
5. In terms of electric field lines, what would it mean if the net flux through a closed surface was zero?

a) Any field lines that enter volume bound by the surface would also leave the volume.

b) All field field lines that enter the volume bound by the surface terminate inside the volume.

c) All field lines intersect the surface perpendicular to the surface (i.e. parallel to the surface normal).

d) None of the above.

6. If an electron were enclosed by a cubic Gaussian surface with side length L, what would the net flux through the surface be?

a) $\frac{-q_{\text{enc}}}{\epsilon_0}$

b) $\frac{q_{\text{enc}}}{\epsilon_0}$

c) $\frac{-e}{\epsilon_0}$

d) $\frac{e}{\epsilon_0}$

e) $\frac{-eL^3}{\epsilon_0}$

f) $\frac{eL^3}{\epsilon_0}$

g) None of the above.

7. If a conductor has a cavity with a 2 nC charge inside, how much charge will be accumulated on the inside surface surrounding the cavity?

a) -1 nC

b) 1 nC

c) -2 nC

d) 2 nC

e) -4 nC

f) 4 nC

g) None of the above.

8. What is the electric field stength just outside a large, flat conducting surface with charge density σ on it?

a) $\frac{\sigma}{2}$

b) $\frac{\sigma}{2\epsilon_0}$

c) $\frac{\epsilon_0\sigma}{2}$

d) $\frac{k\sigma}{2}$

e) None of the above.