Problem 1
A square of side length 0.5 m lies in the xy-plane centered on the origin. A constant electric field $\vec{E} = (9j + 12k)$ N/C passes through this square. What is the magnitude of the electric flux through the square?

Problem 2
A Gaussian surface encloses 3 point particles. Two of those particles have a charge of +2 mC and +3 mC. If the total electric flux out of the surface is given by $+2.82 \times 10^8 \text{Nm}^2/\text{C}$ what is the charge of the third particle?

Problem 3
Consider a Gaussian surface that consists of cube of side length 1 m that is centered on the origin of a xyz coordinate system and whose sides are parallel to the xy-, yz, and xz-planes.

a) What is the electric flux out of this cube from an electric field $\vec{E} = 3i + 4z\hat{k}$ where $E$ is in N/C and $z$ is in meters?

b) What is the total charge enclosed by the cube?

HINT: Carefully consider the area vector for each face of the cube. Does the electric field through that face in the direction of the area vector vary across that face?