

19.1: Flux Integrals

Calculus III

College of the Atlantic

1. Consider the vector field:

$$\vec{F} = 3\vec{i} - 4\vec{j} + 5\vec{k} . \quad (1)$$

Consider a cube with one corner at the origin. The length of each side of the cube is 2, extending in the positive direction. I.e., the coordinates of the corners are $(0, 0, 0)$, $(0, 0, 2)$, $(0, 2, 0)$, $(0, 2, 2)$, $(2, 0, 0)$, $(2, 0, 2)$, $(2, 2, 0)$, $(2, 2, 2)$. Determine the flux out of the cube:

- (a) Calculate the flux through the top of the cube.
 - (b) Calculate the flux through the bottom of the cube.
 - (c) Calculate the flux through the left of the cube.
 - (d) Calculate the flux through the right of the cube.
 - (e) Calculate the flux through the front of the cube.
 - (f) Calculate the flux through the back of the cube.
2. Repeat the above question using the following field:

$$\vec{G} = z\vec{i} - 3\vec{j} + z\vec{k} . \quad (2)$$