Triangular Sides:

$$-1 \leq y \leq 1 \qquad 0 \leq z \leq 1 \qquad x = 0 \; and \; 5$$

$$d\vec{A} = \pm\hat{i} \qquad \vec{F} = \rho(ae^{\kappa z^2}\hat{j} - b\hat{k})$$

$$\int_s \vec{F} \cdot d\vec{A} = 0$$

Rectangular Side 1:

$$0 \leq x \leq 5 \qquad -1 \leq y \leq 0 \qquad z = -y$$

$$d\vec{A} = -1\hat{j} - 1\hat{k} \qquad \vec{F} = \rho(ae^{\kappa(-y)^2}\hat{j} - b\hat{k})$$

$$\int_s \vec{F} \cdot d\vec{A} = \int_0^5 \int_{-1}^0 \rho(b - ae^{\kappa(-y)^2})dydx$$

Rectangular Side 2:

$$0 \leq x \leq 5 \qquad 0 \leq y \leq 1 \qquad z = y$$

$$d\vec{A} = 1\hat{j} - 1\hat{k} \qquad \vec{F} = \rho(ae^{\kappa y^2}\hat{j} - b\hat{k})$$

$$\int_s \vec{F} \cdot d\vec{A} = \int_0^5 \int_0^1 \rho(ae^{\kappa y^2} + b)dydx$$

Total Flux Surface Integral:

$$\Phi_{net} = \int_0^5 \int_{-1}^0 \rho(b - ae^{\kappa(-y)^2})dydx + \int_0^5 \int_0^1 \rho(ae^{\kappa y^2} + b)dydx$$