3.57 Let X, Y, and Z have the joint probability density function

$$f(x, y, z) = \begin{cases} kxy^2z, & 0 < x, y < 1, \ 0 < z < 2, \\ 0, & \text{elsewhere.} \end{cases}$$

(a) Find k.

(b) Find $P(X < \frac{1}{4}, Y > \frac{1}{2}, 1 < Z < 2)$.