(1) Find the area of the region that lies inside $r = 3 \cos \theta$ and outside $r = 1 + \cos \theta$.

(2) Find an equation of a sphere if one of its diameter has ends $(2, 1, 4)$ and $(4, 3, 10)$.

(3) Find a unit vector that has the same direction as $\langle 8, -1, 4 \rangle$. 