SHOW ALL WORK!!! Unsupported answers might not receive full credit.

**Problem 1** [4 points] Consider the curve described by $\mathbf{r}(t) = (a \cos t, b \cos t, c \sin t)$ where $a, b, c > 0$ and $a^2 + b^2 = c^2$. Find the following and **simplify** your answers.

a) $|\mathbf{r}(t)|$.

b) $\mathbf{r}'(t)$.

c) $\mathbf{r}(t) \cdot \mathbf{r}'(t)$.

d) $\mathbf{r}(t) \times \mathbf{r}'(t)$.

e) $|\mathbf{r}(t) \times \mathbf{r}'(t)|$.

f) $\frac{d}{dt}|\mathbf{r}(t) \times \mathbf{r}'(t)|$. 