

WRITE YOUR NAME:

MAC 2313 Quiz 7
Tuesday February 6th

Find the length of the curve

$$\mathbf{r}(t) = \langle 2 \sin t, 3 \sin t, 6 \sin t \rangle$$

from $t = 0$ to $t = \pi/2$.

$$\vec{r}'(t) = \langle 2 \cos t, 3 \cos t, 6 \cos t \rangle$$

$$|\vec{r}'(t)| = \sqrt{(2 \cos t)^2 + (3 \cos t)^2 + (6 \cos t)^2}$$

$$= \sqrt{4 \cos^2 t + 9 \cos^2 t + 36 \cos^2 t} = \sqrt{49 \cos^2 t} = 7 |\cos t|$$

$$= 7 \cos t \text{ in this case since } 0 \leq t \leq \pi/2.$$

$$\text{Length} = \int_{t=0}^{t=\pi/2} |\vec{r}'(t)| dt = \int_0^{\pi/2} 7 \cos t dt$$

$$= \left[7 \sin t \right]_0^{\pi/2} = 7 \left(\sin \frac{\pi}{2} - \sin 0 \right)$$

$$= 7(1 - 0) = 7.$$