

15a

$$\vec{r}(t) = (2 \cos(t), 2 \sin(t), 3t)$$

$$\dot{\vec{r}}(t) = (-2 \sin(t), 2 \cos(t), 3)$$

$$\ddot{\vec{r}}(t) = (-2 \cos(t), -2 \sin(t), 0)$$

$$B = \vec{r}\left(\frac{\pi}{2}\right)$$

$$B \left[ 0, 2, \frac{3}{2}\pi \right]$$

$$\dot{\vec{r}}\left(\frac{\pi}{2}\right) = (-2, 0, 3)$$

$$\ddot{\vec{r}}\left(\frac{\pi}{2}\right) = (0, -2, 0)$$

~~RZ~~ ~~||~~ 
$$D = \frac{\|\dot{\vec{r}}\|^3}{\|\ddot{\vec{r}} \times \dot{\vec{r}}\|}$$

$$\vec{v} = \dot{\vec{r}}$$

$$\|\vec{v}\| = \sqrt{(-2)^2 + 0^2 + 3^2} = \sqrt{13}$$

$$\ddot{\vec{r}} \times \dot{\vec{r}} = \begin{pmatrix} 0 \\ -2 \\ 0 \end{pmatrix} \times \begin{pmatrix} -2 \\ 0 \\ 3 \end{pmatrix}$$

$a_1$	$a_2$	$a_3$	$a_1$	$a_2$	
$v_1$	$v_2$	$v_3$	$v_1$	$v_2$	$a_1 v_2 - v_1 a_2$
					↓
$\vec{a} \times \vec{v} = (a_2 v_3 - v_2 a_3, a_3 v_1 - v_3 a_1,$					

$$\vec{a} = (0, -2, 0) \quad 0 \quad -2$$

$$\vec{b} = (-2, 0, 3) \quad -2 \quad 0$$

11 / 2

$$\vec{a} \times \vec{b} = (-6, 0, -4)$$

$$R = \frac{(\sqrt{13})^3}{\|(-6, 0, 4)\|} =$$

$$= \frac{13 \sqrt{13}}{\sqrt{(-6)^2 + 0 + 4^2}} =$$

$$= \frac{13 \sqrt{13}}{\sqrt{52}} = \frac{13 \sqrt{13}}{\sqrt{4 \times 13}} =$$

$$= \frac{13}{2}$$

Ergebnis:

$$R = \left[0, 2, \frac{3}{2}\pi\right]$$

$$R = \frac{13}{2}$$