Answers to Practice Problems Chapter 12

12.1 Vector Functions and Space Curves

1. Line segment from the point $(1,0)$ to $(0,1)$.

2. $\mathbf{r}(t) = \langle 2t, 3t, (1-t)4 \rangle, \;\; 0 \le t \le 1.$

12.2 Calculus of Vector Functions

1. $\mathbf{r}(\pi/4) = \langle \dfrac{1}{\sqrt{2}}, \dfrac{1}{\sqrt{2}} \rangle$ and $\mathbf{r}'(\pi/4) = \langle \dfrac{-1}{\sqrt{2}}, \dfrac{1}{\sqrt{2}} \rangle.$

2. $\mathbf{r}'(t) = \langle 2te^{t^2}, 0, 3\cos(3t) \rangle.$

3. $\langle 4t^4, \dfrac{\cos(3t)}{3}, \dfrac{e^{-2t}}{-2} \rangle.$

12.3 Arc Length

1. t

2. a) $3t$ \quad b) $t = \dfrac{25}{3}, \;\; (x,y,z) = \left(\dfrac{28}{3}, \dfrac{-41}{3}, \dfrac{62}{3} \right).$