

$$8. \quad \vec{r}(t) = \underbrace{4t}_{x} \vec{i} + \underbrace{t^2}_{y} \vec{j} \quad \underbrace{(4, 1)}_x$$

$$x = 4t \quad y = t^2$$

$$\frac{x}{4} = t \quad y = \left(\frac{x}{4}\right)^2$$

$$y = \frac{x^2}{16}$$

$$y = \frac{1}{16} x^2$$

$$y' = \frac{2}{16} x$$

$$= \frac{1}{8} x$$

$$y'' = \frac{1}{8}$$

$$y' = \frac{1}{8} x \quad y'' = \frac{1}{8}$$

$$y' = \frac{1}{8} (4)$$

$$y' = \frac{1}{2} \quad y'' = \frac{1}{8}$$

$$K = \frac{|y''|}{[1 + (y')^2]^{3/2}}$$

$$= \frac{|\frac{1}{8}|}{[1 + (\frac{1}{2})^2]^{3/2}}$$

$$= \frac{\frac{1}{8}}{(\frac{5}{4})^{3/2}}$$

$$= \frac{\frac{1}{8}}{\left[\left(\frac{5}{4}\right)^{\frac{1}{2}}\right]^3}$$

$$= \frac{\frac{1}{8}}{\left[\sqrt{\frac{5}{4}}\right]^3}$$

$$= \frac{\frac{1}{8}}{\left[\frac{\sqrt{5}}{\sqrt{4}}\right]^3}$$

$$= \frac{\frac{1}{8}}{\frac{\sqrt{5}^3}{2^3}}$$

$$= \frac{\frac{1}{8}}{\frac{5\sqrt{5}}{8}}$$

$$= \frac{1}{5\sqrt{5}}$$

$$= \left(\frac{\sqrt{5}}{25}\right)$$