

$$[2][a] s'(t) = \boxed{-t^{-2} \cos(t^2) + t^{-1}(-\sin(t^2))(2t)} \textcircled{\frac{1}{2}}$$

$$= \boxed{-t^{-2} \cos(t^2) - 2 \sin(t^2)} \textcircled{\frac{1}{2}}$$

$$s''(t) = \boxed{2t^{-3} \cos(t^2) - t^{-2}(-\sin(t^2))(2t) - 2(\cos(t^2))(2t)} \textcircled{2}$$

$$= \boxed{2t^{-3} \cos(t^2) + 2t^{-1} \sin(t^2) - 4t \cos(t^2)} \textcircled{\frac{1}{2}}$$

$$[b] \frac{dy}{dx} \Big|_{x=2} = s'(2) = \boxed{-\frac{1}{4} \cos 4 - 2 \sin 4} \textcircled{\frac{1}{2}}$$

$$\begin{aligned}
 [3][a] \quad f'(\theta) &= \left[(\sec \theta \tan \theta) \sin(2 \cos \theta) \right. \\
 &\quad \left. + (\sec \theta)(\cos(2 \cos \theta))(-2 \sin \theta) \right] \left(\frac{1}{2} \right) \\
 &= \left[\sec \theta \tan \theta \sin(2 \cos \theta) - 2 \tan \theta \cos(2 \cos \theta) \right] \left(\frac{1}{2} \right)
 \end{aligned}$$

$$[b] \text{ LET } t = 2 \cos \theta$$

$$\frac{t}{2} = \cos \theta$$

$$\frac{2}{t} = \sec \theta$$

$$\lim_{\theta \rightarrow \frac{\pi}{2}} 2 \cos \theta = 2 \cos \frac{\pi}{2} = 0 \left(\frac{1}{2} \right)$$

$$\lim_{t \rightarrow 0} \frac{2}{t} \sin t = 2 \lim_{t \rightarrow 0} \frac{\sin t}{t} = 2 \cdot 1 = 2 \left(\frac{1}{2} \right)$$

$$[4] \quad \frac{dy}{dx} = \left[\frac{(2^x \ln 2)m(x) - 2^x m'(x)}{[m(x)]^2} \right] \textcircled{\frac{1}{2}}$$

$$\frac{dy}{dx} \Big|_{x=3} = \frac{(2^3 \ln 2)m(3) - 2^3 m'(3)}{[m(3)]^2} = \left[\frac{(8 \ln 2)(-2) - 8(7)}{(-2)^2} \right] \textcircled{1}$$

$$= \left[-4 \ln 2 - 14 \right] \textcircled{\frac{1}{2}}$$

$$x=3 \rightarrow y = \frac{2^3}{m(3)} = \frac{8}{-2} = -4$$

$$\textcircled{\frac{1}{2}} \quad \underline{y+4} = (-4 \ln 2 - 14)(x-3) \quad \textcircled{\frac{1}{2}}$$

$$[5][a] \frac{(-3-3t^2)(1+3t^2) - (2-3t-t^3)(6t)}{(1+3t^2)^2} \quad \left(\frac{1}{2}\right)$$

$$= \frac{(-3-12t^2-9t^4) - (12t-18t^2-6t^4)}{(1+3t^2)^2} \quad (1)$$

$$= \frac{-3-12t+6t^2-3t^4}{(1+3t^2)^2} \quad (1)$$

$$[b] \frac{(2-3t)(1+6t)}{t^{\frac{1}{3}}} = \frac{2+9t-18t^2}{t^{\frac{1}{3}}} = 2t^{-\frac{1}{3}} + 9t^{\frac{2}{3}} - 18t^{\frac{5}{3}}$$

$$\frac{d}{dt^3} (2t^{-\frac{1}{3}} + 9t^{\frac{2}{3}} - 18t^{\frac{5}{3}}) \quad (1)$$

$$= \frac{d^2}{dt^2} \left(-\frac{2}{3}t^{-\frac{4}{3}} + 6t^{-\frac{1}{3}} - 30t^{\frac{2}{3}} \right) \quad \left(\frac{1}{2}\right)$$

$$= \frac{d}{dt} \left(\frac{8}{9}t^{-\frac{7}{3}} - 2t^{-\frac{4}{3}} - 20t^{-\frac{1}{3}} \right) \quad \left(\frac{1}{2}\right)$$

$$= -\frac{56}{27}t^{-\frac{10}{3}} + \frac{8}{3}t^{-\frac{7}{3}} + \frac{20}{3}t^{-\frac{4}{3}} \quad (1)$$