Module 4 Lesson 1 Assignment

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1) (a) $\dfrac{n\cos(nt)}{-\sin(t)}$

    (b) When $n\cos(nt) = 0$ it will be horizontal at two points

    (c) When $t = 0$ and $t = \pi$ the tangent line will be vertical $\because$ $\sin(t)$ will be zero and in the denominator, $\therefore$ making the derivative at that point undefined.

2) (a) $\begin{cases} x(t) = 4\sin(t) \\ y(t) = -\cos(t) \end{cases}$

    (b) when $t = 0$, $\begin{cases} x = 0 \\ y = -1 \end{cases}$ and when $t = \frac{\pi}{2}$ $\begin{cases} x = 4 \\ y = 0 \end{cases}$ $\therefore$ $\dfrac{0 - (-1)}{4 - 0} = \boxed{\frac{1}{4}}$

    (c) $\dfrac{1}{4} = \dfrac{\sin(t)}{4\cos(t)} \Rightarrow \dfrac{1}{4} = \dfrac{1}{4}\dfrac{\sin(t)}{\cos(t)} \Rightarrow 1 = \tan(t) \Rightarrow t = \dfrac{\pi}{4}$

    when $\boxed{t = \frac{\pi}{4}}$ the slope of the tangent line is equal to the average rate of change