1. For $f(x) = \sin^2 x$ and $g(x) = 0.5x^2$ on the interval $\left[-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right]$, the instantaneous rate of change f is greater than the instantaneous rate of change of g for which value of x?

   (A) -0.8 (B) 0 (C) 0.9 (D) 1.2 (E) 1.5

2. At how many points in the interval $-2\pi \le x \le 2\pi$ does the tangent line to the graph of the curve $y = x\cos x$ have a slope of $\dfrac{\pi}{2}$?

   (A) 5 (B) 4 (C) 3 (D) 2 (E) 1

3. Let f be the function given by $f(t) = 2\pi t + \sin(2\pi t)$.
   (a) Find the value(s) of t in the open interval $(0,2)$ for which the line tangent at $(t, f(t))$ is parallel to the line through $(0,0)$ and $(2, 4\pi)$.
   (b) Suppose the given function describes the position of a particle on the x-axis for time $0 \le t \le 2$. What is the average velocity of the particle over that interval?
   (c) Determine the velocity and acceleration of the particle at $t = 1$.