1. (6 pts.)   Find the derivative of $f(x) = \cos\left(3 + 2x + 4x^3\right)$.

2. (7 pts.)   If $y = x^2 \tan\left(x^2\right)$, find $\dfrac{dy}{dx}$.

3. (7 pts.) Suppose $f(x)$ is a function for which $f\left(\frac{\pi}{3}\right) = 4$, $f'\left(\frac{\pi}{3}\right) = -2$ and $f''\left(\frac{\pi}{3}\right) = 6$.
   Let $g(x) = f(x)\sin(x)$. Find the exact value of $g''\left(\frac{\pi}{3}\right)$.

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