5. [15 points] The function \( h(x) \) is not known, but the derivative of \( h(x) \) is given by the formula

\[
h'(x) = \sin(x)e^{x^2+1}.
\]

\[ 
\textbf{a.} \ [2 \text{ points}] \text{ Find a formula for } h''(x).
\]

\[ 
\textbf{b.} \ [6 \text{ points}] \text{ List all critical points for } h(x) \text{ in the open interval } -2\pi < x < 2\pi. \text{ For each point, use an appropriate test to determine whether it is a local maximum, local minimum, or neither.}
\]

\[ 
\textbf{c.} \ [2 \text{ points}] \text{ For which } x\text{-value in the closed interval } \frac{\pi}{4} \leq x \leq \frac{\pi}{2} \text{ does } h(x) \text{ attain its maximum value? (Do not try to find the } y\text{-coordinate.)}
\]

\[ 
\textbf{d.} \ [5 \text{ points}] \text{ Write out all terms for a right-hand Riemann sum with three subintervals which approximates}
\]

\[
\int_0^1 \sin(x)e^{x^2+1} \, dx.
\]