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

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

a. [2 points] Find a formula for $h''(x)$.

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

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

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

$$\int_0^1 \sin(x)e^{x^2+1}dx.$$