6. [4 points] Formulas for a function $g(x)$ and its derivative $g'(x)$ are given below.

$$g(x) = (2-4x)e^{-x^2} \quad \text{and} \quad g'(x) = 4(2x+1)(x-1)e^{-x^2}.$$

Find all global extrema of $g(x)$ on the open interval $(0, \infty)$. Use calculus to find and justify your answers, and be sure to show enough evidence to demonstrate that you have found all global extrema. Write NONE if appropriate.

Answer: global max(es) at $x =$ _____

global min(s) at $x =$ _____

7. [5 points] Consider the family of functions given by $g(x) = x\ln(px^2+q)$, for constants p and q. Find values of p and q so that the function has a local extremum at $(1, 2)$. Be sure to justify (using calculus) that your resulting function does have a local extremum at $(1, 2)$ and to determine the type of extremum. Leave your answers in exact form.
You may find the following information to be useful.

$$g'(x) = \ln\left(px^2+q\right) + \frac{2px^2}{px^2+q} \quad \text{and} \quad g''(x) = \frac{2px(px^2+3q)}{(px^2+q)^2}$$

Answer: $p =$ _____ and $q =$ _____

Circle one: LOCAL MAXIMUM LOCAL MINIMUM