

Find the  $x$ -values where each function attains its maximum and minimum on the given interval.

1.  $f(x) = \ln(x) - \frac{x^2}{8}$  on  $[1, 4]$

2.  $f(x) = \sin(x^2)$  on  $[0, 2.5]$

3.  $f(x) = x^2 e^{-x}$  on  $[1, 4]$