10. [8 points] You are not required to show your work on this page.

a. [2 points] Circle the one option that correctly fills in the blank.

The local linearization of $B(x) = e^{x^2}$ at $x = 5$ is given by $L(x) =$ ____________.

$e^{25} + (2xe^{x^2})(x-5)$ $\qquad$ $e^{x^2} + (2xe^{x^2})(x-5)$ $\qquad$ $2e^{25}x - 5$

$B'(a)(x-a) + B(x)$ $\qquad$ $\boxed{e^{25}(10x-49)}$ $\qquad$ $e^{x^2} + (10e^{25})(x-5)$

b. [3 points] Suppose $g(x)$ is a function such that $g''(x)$ exists for all real numbers x. Suppose further that $g'(x)$ (the derivative of $g(x)$) has a critical point at $x = 2$.
Circle all the statements below that must be true or circle NONE OF THESE.

$g(x)$ has a local extremum at $x = 2$.

$g(x)$ has an inflection point at $x = 2$.

$g'(2) = 0$.

$\boxed{g''(2) = 0.}$

NONE OF THESE

c. [3 points] Let $f(x)$ be a differentiable function such that for all real numbers x, $f(x) < 0$ and $f'(x) < 0$. Let $j(x) = f(f(x))$.
Circle all the statements below that must be true or circle NONE OF THESE.

$j(x) > 0$ for all x.

$\boxed{j(x) < 0 \text{ for all } x.}$

$\boxed{j'(x) > 0 \text{ for all } x.}$

$j'(x) < 0$ for all x.

$\boxed{j(x) \text{ has no local extrema.}}$

NONE OF THESE