1. Consider the function \( f(x) = x^{(x^3 - 4x)} \) (You can write \( y = x^{(x^3 - 4x)} \) if you prefer).

1A: Use logarithmic differentiation to find the derivative \( f' \) of \( f \). (You can write \( y'/y \) if you like). Express the result in terms of \( x \).

1B: Use the answer to 1A to find the slope of the line tangent to the graph of \( f \) at the point \((1, f(1))\). Show all your steps.

1C: Have your calculator draw the graph of \( f \) in the window 

\([X_{\text{min}}, X_{\text{max}}] \times [Y_{\text{min}}, Y_{\text{max}}] = [-1, 3] \times [-1, 5]\] and make an excellent facsimile of the result in the space to the right:

1D: Using the calculator’s “maximum” function (it’s on the same menu as the “zero” function) to locate the \( x \)-coordinate of the local max you see in 1C. Tell me what you used for your LeftBound, RightBound and your Guess, then also give me the value of \( x \) and \( y \) at that point (to as many places as your calculator gives you).

LeftBound = \( \underline{\hspace{2cm}} \) \hspace{1cm} RightBound = \( \underline{\hspace{2cm}} \) \hspace{1cm} Guess = \( \underline{\hspace{2cm}} \)

\( x \) coord of local max: \( \underline{\hspace{2cm}} \) \hspace{1cm} \( y \) coord of local max: \( \underline{\hspace{2cm}} \)

2. Let \( f(x) = x^3 \sin(5x) \).

2A. Find \( f'(x) \) using the product and chain rules in the usual way.

2B. Find \( f'(x) \) using logarithmic differentiation, and simplify the result so it’s the same as in 2A. \textit{Show all your steps!}