

(6.) (6 points) Let  $f(x) = x^{3x}$ . Use the **definition** of the derivative to express  $f'(2)$  as a limit. You do not need to simplify your expression or try to estimate  $f'(2)$ .

(7.) (8 points) Suppose  $g$  is a differentiable function that satisfies the following three properties:

1.  $g$  is concave up.
2.  $g(1) = 9$ .
3.  $g(5) = 3$ .

(a) What is the average rate of change of  $g$  on the interval  $[1, 5]$ ?

(b) Which is larger,  $g'(2)$  or  $g'(4)$ ? Explain.

(c) What is the maximum possible value for  $g(3)$ ? (Hint: try sketching a graph of  $g$ .) Explain your reasoning.