

3. (12 points) Consider the family of cubics of the form

$$f(x) = ax^3 + bx + c$$

with  $a, b$ , and  $c$  non-zero constants.

(a) (2 points) Using the function  $f(x) = ax^3 + bx + c$  as given above, write the **limit definition** of the derivative function,  $f'(x)$ . (No need to expand or simplify—just apply the definition to this function, using proper notation.)

(b) (6 points) Under what conditions, if any, on  $a, b$ , and  $c$  will  $f$  have local extrema (i.e., maxima/minima)?

(c) (4 points) Under what conditions, if any, on  $a, b$ , and  $c$  will  $f$  have inflection point(s)?