

Calculus

Instructions Please write your name in the upper right-hand corner of the page. Write complete sentences to explain your solutions.

1. Use the definition of the derivative as a limit to prove that $\frac{d}{dx}x^2 = 2x$.

2. Find an equation for the line tangent to the curve $y = x^3$ at the point on the curve where $x = 2$.

[We now officially know the power rule for derivatives, and you may use that rule in answering this question.]

3. Give an example of a function $f(x)$ such that the derivative $f'(0)$ does not exist.
[There are many possible correct answers. Give a one-sentence explanation of why your example works.]

4. The figure shows the graph of a certain function. Draw a sketch of the graph of the derivative of this function.

