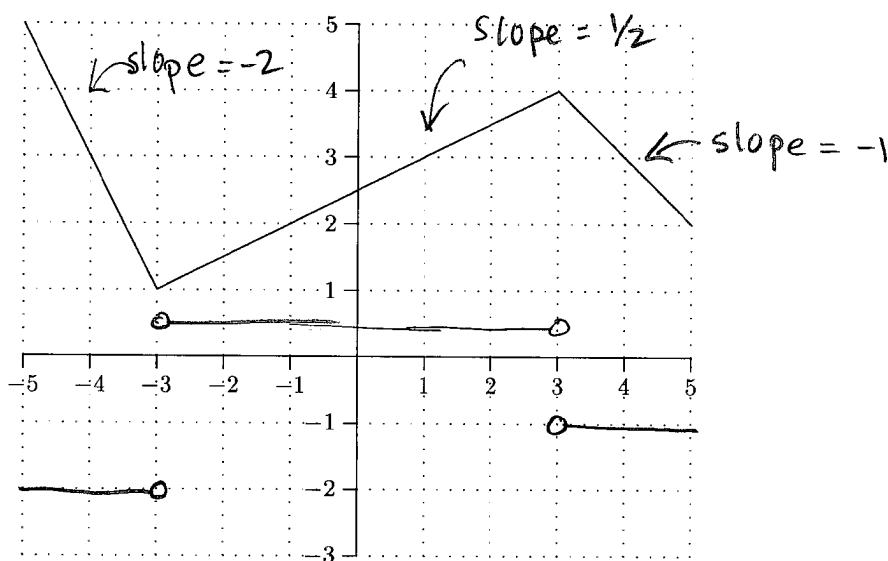


Lab Ticket: Complete and Bring to Lab. Name: Answers

1. Use the definition to find the derivative of $f(x) = x^3$. [Be careful when you cube $x + h$.] Start with

$$\begin{aligned}
 f'(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h} = \lim_{h \rightarrow 0} \frac{x^3 + 3x^2h + 3xh^2 + h^3 - x^3}{h} \\
 &= \lim_{h \rightarrow 0} \frac{3x^2h + 3xh^2 + h^3}{h} \\
 &= \lim_{h \rightarrow 0} 3x^2 + 3xh + h^2 \\
 &= 3x^2 + 0 + 0 \\
 &= 3x^2
 \end{aligned}$$

2. [Graphical Differentiation] Let $f(x)$ be the piecewise function shown in the figure. On the same set of axes, plot the graph of $f'(x)$. Remember that the geometric meaning of $f'(x)$ is the tangent slope the tangent slope. So for each x between -5 and 5 plot the value of the slope of the original graph $f(x)$. Careful: Indicate where $f'(x)$ does not exist.



3. Bring a calculator to lab! Put it with your backpack now. check!