

## Math 263A More Examples for Finding Derivatives Graphically

To create a rough sketch of  $f'$  :

- Draw the tangent line to the graph of  $f$  at the point where  $x = 0$ .
- Find the slope  $m$  of the line that you have just drawn.
- Put the point  $(0, m)$  on the lower set of axes for  $f'$ .
- Draw the tangent line to the graph of  $f$  at the point where  $x = 1$ .
- Find the slope  $m$  of the line that you have just drawn.
- Put the point  $(1, m)$  on the lower set of axes for  $f'$ .
- Repeat the process for  $x = 2, 3, \dots, 10$ .
- Connect all the dots on the lower set of axes with a smooth curve. This curve is a rough version of  $f'$ .

Tips for drawing good tangent lines and quickly measuring their slopes.

- Choose a point on the graph of  $f$  where you wish to draw the tangent line. Call this point  $(a, b)$ . Put a sharp pencil on this point and keep it firmly anchored there.
- Push a ruler up against the pencil. (Keep the pencil anchored to point  $(a, b)$ !)
- Pivot the ruler around the pencil until it looks like the edge of the ruler is parallel to the graph of  $f$  at the point  $(a, b)$ . (Keep the pencil anchored to point  $(a, b)$ !)
- When the ruler looks most parallel to the graph, press the ruler down firmly on the paper. Keeping the ruler firmly anchored in this position, slide the pencil along the edge of the ruler to draw the tangent line. Draw as long a tangent line as will fit on the grid.
- Choose a right triangle that has grid lines as its legs and the tangent line as its hypotenuse. Using the lengths of the triangle legs for  $\Delta y$  and  $\Delta x$ , compute the slope  $m = \frac{\Delta y}{\Delta x}$  on a calculator.







