WORKSHEET: TANGENT LINES AND LINEAR APPROXIMATION

Names and student IDs: _____

Recall: the tangent line to the graph of $y = f(x)$ at $x = a$ (at the point $(a, f(a))$ on the graph) goes through the point $(a, f(a))$ and has slope $f'(a)$.

1. Consider the function $g(x) = x^2 + 2x$.

(a) Write the equation of the tangent line to the graph at $x = 2$ in the first form discussed in lecture: $y - y_0 = m(x - x_0)$ for suitable x_0, y_0, m. (This is sometimes called "point-slope" or "slope-point" form.)

(b) Make sure your answer above really is the equation of a line!

(c) Write the equation of the tangent line to the graph at $x = 2$ in the linear approximation form.

(d) Write the equation of the tangent line to the graph at $x = 2$ in the usual form $y = mx + b$ for some m and b. (I think this is sometimes called "slope-intercept" form.)

2. Suppose $f(3) = 9$ and you know f is continuous at 9, but nothing more. What are your best guesses for $f(3.3)$ and $f(2.9)$?

3. In problem 2, suppose you **also** know that f is differentiable at 3 and $f'(3) = 2$. Now what are your best guesses for $f(3.3)$ and $f(2.9)$?

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