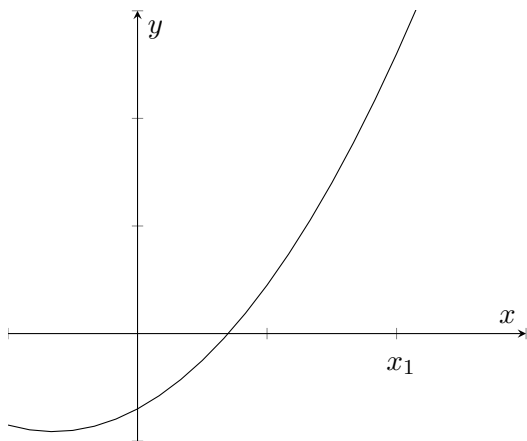


LECTURE NOTES: 4-8 NEWTON'S METHOD (PART 1)

MOTIVATING QUESTION: Recall that we wanted to find the x -intercepts of $f(x) = x - 2 \sin x$. From the graph we knew there exists a positive (and negative) solution. How to find it?

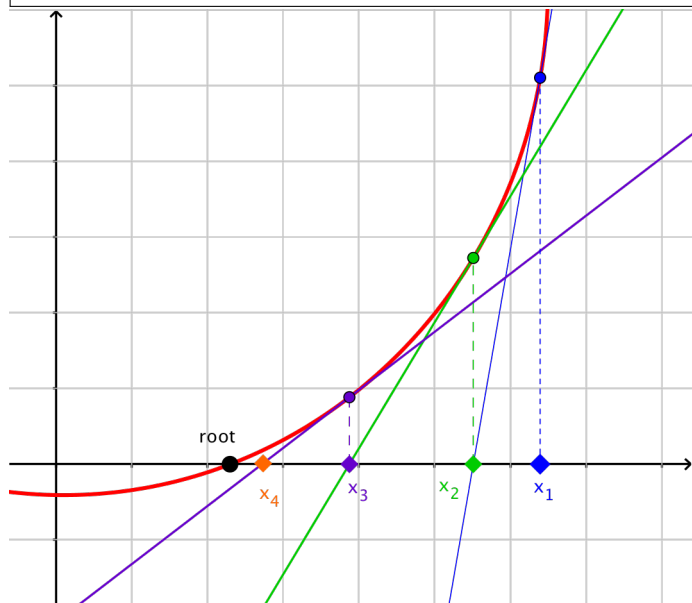
WARM-UP PROBLEMS:

1. Write the equation of the line tangent to the curve $y = f(x)$ at the x -value x_1 . Sketch the tangent line in the "cartoon" of $f(x)$ below.



2. In your picture above, label the x -value where the tangent line intersects the x -axis as x_2 .
3. Solve for x_2 using your equation from part (1) above.

GEOMETRIC EXPLANATION OF NEWTON'S METHOD:



MODEL PROBLEM: Let $f(x) = x^3 - 5x$.

1. Factor $f(x)$, find its roots algebraically, and sketch its graph.
2. Assume you couldn't factor the function and you wanted to find its positive root. What would be a reasonable first guess and why?
3. Using a first guess of $x_1 = 3$, calculate 2 iterations of Newton's method
4. How close is your estimate of the root, x_3 , to the actual root?