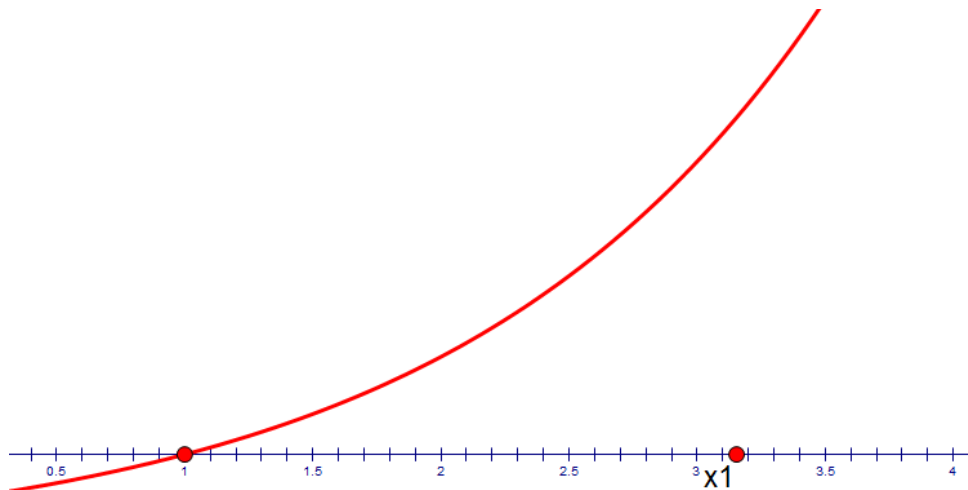# Newton's Method for Approximating Zeros of a Function

**Basic Idea:**

1. Find the point $(x_1, f(x_1))$ on the graph.

2. Draw the line tangent to the graph at $(x_1, f(x_1))$.

3. Locate $x_2$, the point where the tangent line crosses the x-axis.

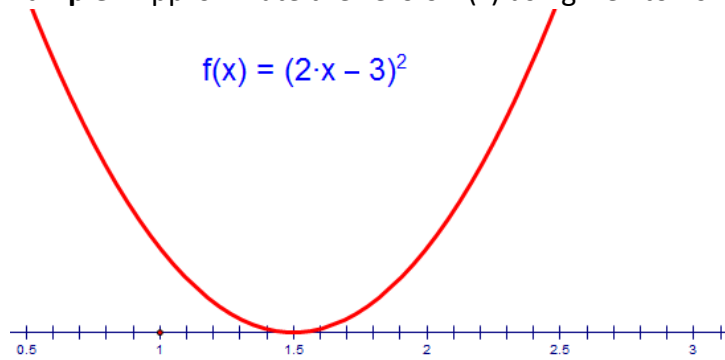4. Repeat the steps using $x_2$ to find $x_3$, $x_3$ to find $x_4$, $x_4$ to find $x_5$, etc.

Note: Newton's Method is a process (or *Algorithm*) that generates a *recursive sequence* of x values that get progressively closer to the actual zero of f(x).

**Deriving an Algorithm:**

$(x_n, f(x_n))$

$x_{n+1}$   $x_n$
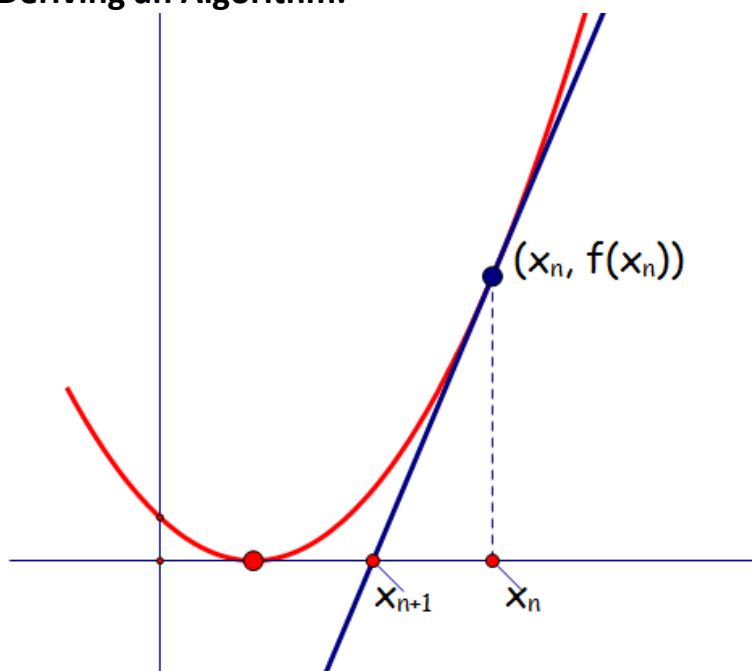
**Example:**  Approximate the zero of f(x) using Newton's Method.

f(x) = (2·x − 3)²
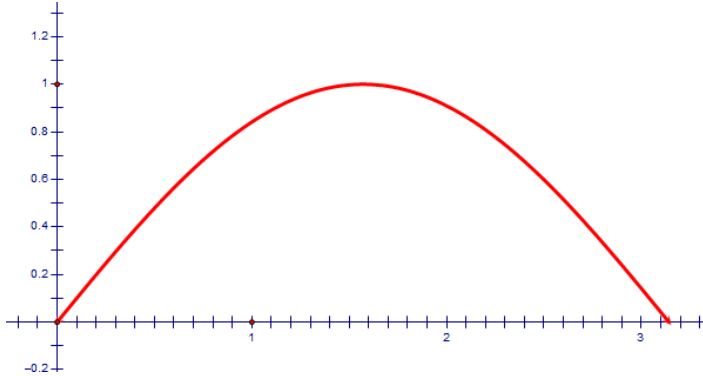
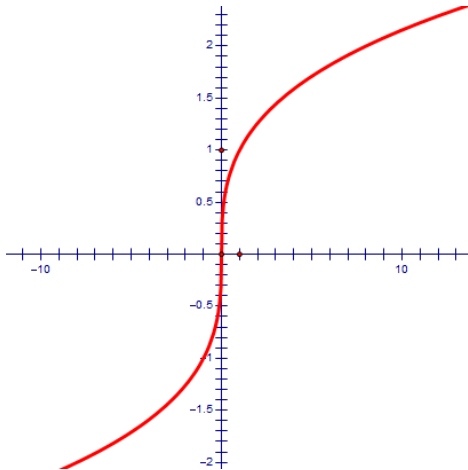**Example:** Use Newton's Method to approximate where the graphs of $f(x) = x^2$ and $g(x) = 2$ intersect.

# Does Newton's Method Always Work?

For each picture, describe how Newton's Method may fail to find a zero (or find the wrong zero) for the function pictured.

a.



b.



c.