1. Let $f(x) = \cos(x) + 2\sin(x) + x^2$. Use Newtons method to approximate the root in the interval $[-1, 0]$. Let $x_1 = 0$ and find x_4.

2. Approximate $\sqrt{13}$ correct up to 5 decimal places.

3. Consider the function $f(x) = x^2 - 3x + 1$. Let x_1 be $0, 1, 2, 4$. What is x_2 in each situation? Can you estimate one root or two?

4. Find all anti-derivatives of the following functions.

   (a) $f(t) = \frac{1}{\sqrt[3]{t}}$

   (b) $f(x) = \pi\cos(x) + x^5$

   (c) $f(x) = \sec^2(x) + \sec(x)\tan(x)$

   (d) $g(x) = \frac{2x^3 - \sqrt{x}}{2x}$

5. Find $f(x)$ when $f''(x) = 12x - 8$, $f'(1) = 4$, and $f(1) = 3$.

6. Given that the graph of f passes through the point $(1, 6)$ and that the slope of its tangent line at $(x, f(x)$ is $2 - 3x$, find $f(1)$.

7. Find a function f such that $f'(x) = 3x^2$ and the line $3x - y = 4$ is tangent to the graph of f.