Newtons Method

Solutions should show all of your work, not just a single final answer.

1. Starting with $x_1 = 2$, find the third approximation x_3 to the root of $x^3 - 3x - 3 = 0$. Round your answer to 3 decimal places.

2. Starting with $x_1 = 1$, apply Newton's method to solve $x^3 - x - 1 = 0$ by finding the least n such that x_n and x_{n+1} agree to three decimal places.

3. The solutions to $\sin x = 0$ are $x = \pi k$, where k is any whole number (see Figure 1). In particular, the smallest positive solution to $\sin x = 0$ is $x = \pi$.

   You will use Newton's method for $\sin x = 0$ to make numerical estimates for π.

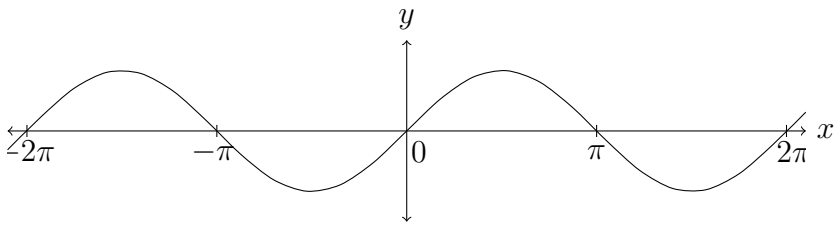

Figure 1: Graph of $y = \sin x$.

   (a) Use Newton's method for $\sin x = 0$ with $x_1 = 3$, find the first x_n for which x_n and x_{n+1} agree to 5 digits decimal places. (Be sure you compute trigonometric functions using radians, *not* degrees!)

   (b) For the x_n you found in part (a), to how many decimal places does x_n actually agree with π?