MTH 121 — Fall — 2004

Essex County College — Division of Mathematics

Quiz # 9[1] — December 2, 2004

Name: _____

Signature: _____

Show all work clearly and in order, and box your final answers. Justify your answers algebraically whenever possible. You have 20 minutes to take this 10 point quiz. When you do use your calculator, sketch all relevant graphs and write down all relevant mathematics.

1. Starting with $x_1 = 2$, find the second approximate x_2, accurate to six decimal places, to the root of the equation $x^3 - 2x - 5 = 0$. You *must* use Newton's method.

   Solution:

$$\begin{aligned} f(x) &= x^3 - 2x - 5 \\ f'(x) &= 3x^2 - 2 \\ x_2 &= x_1 - \frac{f(x_1)}{f'(x_1)} \\ x_2 &= 2 - \frac{f(2)}{f'(2)} = 2 + \frac{1}{10} = \boxed{2.100000} \end{aligned}$$

2. Find $f(x)$ if $f''(x) = 12x^2 + 6x - 4$, and $f(0) = 4$ and $f(1) = 1$.

   Solution:

$$\begin{aligned} f'(x) &= 4x^3 + 3x^2 - 4x + C_1 \\ f(x) &= x^4 + x^3 - 2x^2 + C_1 x + C_2 \\ f(0) &= C_2 = 4 \\ f(1) &= 1 + 1 - 2 + C_1 + 4 = C_1 + 4 = 1 \\ C_1 &= -3 \\ f(x) &= \boxed{x^4 + x^3 - 2x^2 - 3x + 4} \end{aligned}$$

[1] This document was prepared by Ron Bannon using LaTeX.