MTH 121 — Fall — 2004

**Essex County College — Division of Mathematics**

Quiz # 8[1] — November 19, 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. Given a function ($f(x)$) and its first ($f'(x)$) and second ($f''(x)$) derivatives:

$$\begin{aligned} f(x) &= \frac{\sqrt[3]{x}}{1-x} \\ f'(x) &= \frac{(1+2x)}{3\sqrt[3]{x^2}(1-x)^2} \\ f''(x) &= \frac{2\left(5x^2+5x-1\right)}{9\sqrt[3]{x^5}(1-x)^3} \end{aligned}$$

Sketch the graph of $f(x)$ and answer these questions:

(a) $x$-intercept(s). Answer: $\boxed{(0,0)}$.

(b) $y$-intercept(s). Answer: $\boxed{(0,0)}$.

(c) vertical asymptote(s). Answer: $\boxed{x=1}$.

(d) horizontal asymptote(s). Answer: $\boxed{y=0}$.

(e) domain. Answer: $\boxed{\mathbb{R}, x \neq 1}$.

(f) range. Answer: $\boxed{\mathbb{R}}$.

(g) local maximum(s). Answer: $\boxed{\text{none}}$.

(h) local minimum(s). Answer: $\boxed{\left(-\frac{1}{2}, f\left(-\frac{1}{2}\right)\right)}$.

(i) global maximum(s). Answer: $\boxed{\text{none}}$.

(j) global minimum(s). Answer: $\boxed{\text{none}}$.

(k) points of inflection(s). Answer:

$$\boxed{\left(\frac{-5-3\sqrt{5}}{10}, f\left(\frac{-5-3\sqrt{5}}{10}\right)\right), (0,0), \text{and } \left(\frac{-5+3\sqrt{5}}{10}, \text{f}\left(\frac{-5+3\sqrt{5}}{10}\right)\right)}.$$

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