MTH 121 — Fall — 2004

Essex County College — Division of Mathematics

Quiz # 5[1] — October 15, 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. Differentiate $f(x) = \frac{2x-1}{3x+2}$.

   Differentiate $f(x)$:

   $$f'(x) = \frac{(3x+2)(2) - (3)(2x-1)}{(3x+2)^2} = \frac{7}{(3x+2)^2}$$

2. Differentiate $f(x) = \frac{1}{x} - x^2$.

   Simplify $f(x)$ first, by rewriting $\frac{1}{x}$ as x^{-1}:

   $$f(x) = \frac{1}{x} - x^2 = x^{-1} - x^2$$

   Now differentiate $f(x)$:

   $$f'(x) = -x^{-2} - 2x = \frac{-1 - 2x^3}{x^2}$$

3. Differentiate $f(x) = \frac{\sqrt{x}-1}{\sqrt{x}+1}$.

   Simplify $f(x)$ first by rewriting $\sqrt{x}$ as $x^{\frac{1}{2}}$:

   $$f(x) = \frac{\sqrt{x}-1}{\sqrt{x}+1} = \frac{x^{\frac{1}{2}}-1}{x^{\frac{1}{2}}+1}$$

   Now differentiate:

   $$f'(x) = \frac{\left(x^{\frac{1}{2}}+1\right)\left(\frac{1}{2}x^{-\frac{1}{2}}\right) - \left(\frac{1}{2}x^{-\frac{1}{2}}\right)\left(x^{\frac{1}{2}}-1\right)}{\left(x^{\frac{1}{2}}+1\right)^2} = \frac{1}{\sqrt{x}\left(\sqrt{x}+1\right)^2}$$

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