For questions: at52@rice.edu February 24

IN-CLASS ACTIVITY : QUOTIENT RULE

1. Using the definition of derivative, compute the derivative of $f(x) = \frac{1}{x^2+1}$. Then compare the result you obtain from the quotient rule.

2. Compute the derivative of the following functions :

i) $f(x) = \frac{2x+1}{x+3}$
ii) $f(x) = \frac{x^2+2x+3}{x+2}$
iii) $f(x) = \frac{e^x}{x}$
iv) $f(x) = \frac{\sin(x)}{x^2}$
v) $f(x) = \frac{\sin(x)\cos(x)}{e^x}$
vi) $f(x) = \frac{1}{\cos(x)}$
vii) $f(x) = (x^2 + 3x + 2)e^{-x}$
viii) $f(x) = \tan(x)(x^3 + 4x)$
ix) $f(x) = e^x \tan(x)(x^2 - 1)$
x) $f(x) = \frac{x\tan(x)}{x+2}$
xi) $f(x) = \frac{x^2e^x}{\sin(x)\cos(x)}$

3. Let $f(x)$ and $g(x)$ be differentiable functions such that $f(1) = 1$, $g(1) = -1$, $f'(1) = 3$ and $g'(1) = 2$.

(a) Compute $h'(1)$ where $h(x) = \frac{f(x)g(x)}{f(x)+x}$

(b) Compute $h'(1)$ where $h(x) = \frac{f(x)}{\sqrt{x}g(x)}$

4. Find the equation of the tangent line to the graph of the function $f(x) = \frac{x^2+1}{x+1}$ at $x = 0$.

5. Find all values of x_0 such that the tangent line to the graph of $f(x) = \tan(x)$ at x_0 is parallel to $y = x$.