MA 16010 Lesson 10: Quotient rule & other trig functions

Recal: Last time we discussed **the product rule**:

$$\frac{\mathrm{d}}{\mathrm{d}x}\big[f(x)\cdot g(x)\big] =$$

Using the product rule, one can derive the quotient rule as follows:

$$g(x)\cdot\frac{f(x)}{g(x)} = f(x)$$

Quotient rule: $$\frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{f(x)}{g(x)}\right] =$$

Exercise: Compute $y'(x)$ when $y = \frac{x^2+3x+1}{x-4}$.

Exercise: Compute $y'(\pi)$ when $y = \frac{3\cos(x)-3\sin(x)}{\sin(x)+\cos(x)}$.

Exercise: Compute the derivative of $y = \frac{3x-a}{4x^2+a^2}$ where a is a constant.

Exercise (derivatives of the remaining trig. functions). Use the quotient rule to compute the derivatives

1. We have $\tan(x) =$, therefore

   $(\tan(x))' =$

2. We have $\cot(x) =$, therefore

   $(\cot(x))' =$

3. We have $\sec(x) =$, therefore

   $(\sec(x))' =$

4. We have $\csc(x) =$, therefore

   $(\csc(x))' =$

Summary – derivatives of trigonometric functions.

$(\sin(x))' =$ _____ $(\cos(x))' =$ _____

$(\tan(x))' =$ _____ $(\cot(x))' =$ _____

$(\sec(x))' =$ _____ $(\csc(x))' =$ _____

Exercise: Compute the equation of the tangent line to $y = 3x^2 \sec(x)$ at $x = \pi/3$.