

Name: _____

Panther ID: _____

Worksheet (homework) week 6

Calculus I

Spring 2015

1. Find the equation of the tangent line to the graph $f(x) = x \sin x$ at $x = \frac{\pi}{2}$.
2. Find the coordinates of a point P on the graph of $y = f(x) = x^2 + 3$ with the property that the tangent line to the graph at P will pass through the origin.
3. Use quotient rule to prove $(\cot x)' = -\csc^2 x$ and $(\csc x)' = -\csc x \cot x$. Assume known the derivatives of $\sin x$ and $\cos x$.
4. The following provides a proof for the quotient rule from the product rule.

Let $q(x) = \frac{f(x)}{g(x)}$, be the quotient of two functions $f(x)$ and $g(x)$.

The goal is to get a formula for $q'(x)$ in terms of $f'(x), g'(x), f(x), g(x)$. Proceed as follows:

Start from $q(x) \cdot g(x) = f(x)$. (Why is this true?)

Take the derivative of both sides of the above and use product rule on the left side. Then solve for $q'(x)$ and do a bit of algebra to eventually get the familiar quotient rule formula.