Quiz 1- MAC 2311, Sp'15 **NAME:** Solution Key **Panther ID:** ______

1. (6 pts) Compute the derivative of each of the following functions:

(a) $f(x) = \frac{4}{\sqrt{x}} - 3\cos x + 10^5$ $= 4x^{-\frac{1}{2}} - 3\cos x + 10^5$ (b) $g(x) = \frac{\tan x}{1 + \sec x}$

$f'(x) = 4\cdot\left(-\frac{1}{2}\right)x^{-\frac{3}{2}} - 3\cdot(-\sin x) + 0$

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

$g'(x) = \frac{(\tan x)'(1+\sec x) - \tan x(1+\sec x)'}{(1+\sec x)^2}$

$g'(x) = \frac{\sec^2 x\,(1+\sec x) - \tan x\cdot\sec x\cdot\tan x}{(1+\sec x)^2}$

can be simplified a bit but it's OK like this.

2. (5 pts) Find the equation of the tangent line to the graph of $f(x) = x\sin x$ at $x = \frac{\pi}{2}$.

Point $\left(\frac{\pi}{2}, f\left(\frac{\pi}{2}\right)\right)$ $f\left(\frac{\pi}{2}\right) = \frac{\pi}{2}\sin\frac{\pi}{2} = \frac{\pi}{2}\cdot 1 = \frac{\pi}{2}$

Point $\left(\frac{\pi}{2}, \frac{\pi}{2}\right)$

$f'(x) = (x\cdot\sin x)' = (x)'\cdot\sin x + x(\sin x)' = \sin x + x\cos x$

$m_{tan} = f'\left(\frac{\pi}{2}\right) = \sin\frac{\pi}{2} + \frac{\pi}{2}\cdot\cos\frac{\pi}{2} = 1 + 0 = \boxed{1}$

Tangent line: $\boxed{y - \frac{\pi}{2} = 1\cdot\left(x - \frac{\pi}{2}\right)}$ or $y - \frac{\pi}{2} = x - \frac{\pi}{2}$

or $\boxed{y = x}$