Quiz 2- MAC 2311, F'16 **NAME:** Solution Key **Panther ID:** ______________

1. (8 pts) Compute the derivative of each of the following functions. No need to simplify. (2 pts each).

(a) $y = 5x^4 - 3x^2 + 7$

$y' = 20x^3 - 6x$

(b) $y = \sec x \tan x$

$y' = (\sec x)' \tan x + (\sec x) \cdot (\tan x)'$

$y' = (\sec x)(\tan x) \cdot \tan x + \sec x \cdot \sec^2 x$

$y' = \sec x \cdot \tan^2 x + \sec^3 x$ ← OK like that!

(c) $y = x \sin(x^3)$

$y' = (x)' \sin(x^3) + x \cdot (\sin(x^3))'$

$y' = 1 \cdot \sin(x^3) + x \cdot \cos(x^3) \cdot 3x^2$

or

$y' = \sin(x^3) + 3x^3 \cos(x^3)$

(d) $y = \cos(\sin(\sqrt{x}))$

$y' = (\cos(\sin(x^{\frac{1}{2}})))' = -\sin(\sin(x^{\frac{1}{2}})) \cdot (\sin(x^{\frac{1}{2}}))' =$

$= -\sin(\sin(\sqrt{x})) \cdot \cos(x^{\frac{1}{2}}) \cdot (x^{\frac{1}{2}})' =$

$= -\sin(\sin(\sqrt{x})) \cdot \cos(\sqrt{x}) \cdot \frac{1}{2} x^{-\frac{1}{2}}$

or $y' = -\frac{1}{2\sqrt{x}} \sin(\sin(\sqrt{x})) \cdot \cos(\sqrt{x})$

2. (3 pts) Find the equation of the tangent line to the graph of $f(x) = \frac{2x+1}{x^2+1}$ at $x = 0$.

Point $x=0$ $y = f(0) = \frac{2 \cdot 0 + 1}{0^2+1} = 1$ so Point $(0, 1)$

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

so $$f'(x) = \frac{2x^2+2-4x^2-2x}{(x^2+1)^2} = \frac{-2x^2-2x+2}{(x^2+1)^2}$$

$m_{tan} = f'(0) = \frac{2}{1} = 2$

so tangent line is

$y - 1 = 2(x - 0)$ or $y = 2x + 1$