Show all your work. No credits for answers not supported by work.

Problem 1: (**7 points**) Find all points on the graph of $y = \dfrac{4x}{x^2 + 1}$, where the tangent line is horizontal.

Problem 2: (**7 points**) If $y = \tan^5(\sin^3(x^7 - 1))$ find $\dfrac{dy}{dx}$.

Problem 3: (**7 points**) Find the equation of the line tangent to the curve $2x + \sin(xy) = e^y - 1$ at the point (0,0)

Problem 4: (7 points) If $y = (\sin x)^{\ln x}$, find $\dfrac{dy}{dx}$ at the point $(1,1)$.

Problem 5: (7 points) Find the slope of the line(s) tangent to the curve $y = x^2 + 7$ and passes through the point $(3,0)$.

Problem 6: (7 points) Find the limit if it exists $\displaystyle\lim_{\theta \to \pi/3} \dfrac{\sec\theta - 2}{\theta - \pi/3}$