1. Let f be a function with $f(1) = -4$ such that for all points (x,y) on the graph of f the slope is given by $\dfrac{3x^2 + 1}{2y}$. Find $f(x)$.

2. The function f is differentiable for all real numbers. The point $\left(3, \dfrac{1}{4}\right)$ is on the graph of $y = f(x)$, and the slope at each point (x,y) on the graph is given by $\dfrac{dy}{dx} = y^2(6 - 2x)$. Find $y = f(x)$ by solving the differential equation $\dfrac{dy}{dx} = y^2(6 - 2x)$ with the initial condition $f(3) = \dfrac{1}{4}$