Q1. Solve the initial value problem;

$$\frac{dy}{dt} = \frac{1}{1+t^2} \quad \text{where} \quad y(0) = -1$$

Q2. Evaluate $\int \cot x \, dx$

Q3. Evaluate $f(2)$ if $\int_{2x}^{1} f(t) \, dt = \sin(\pi x)$, (**Hint**: differentiate !)