1. Prove that \((\tan x)' = \sec^2 x\). \((\text{Hint: recall that } \tan x = \sin x / \cos x \text{ and differentiate using the quotient rule}).\)

2. Use the power rule for integer exponents and implicit differentiation to prove the power rule for rational exponents \((\text{Hint: Let } y := x^{\frac{p}{q}} \text{ where } p \text{ and } q \text{ are integers. Then } y^q = x^p. \text{ Differentiate both sides implicitly to show that } y' = \frac{p}{q} x^{\frac{p}{q}-1}).\)

\[\text{Each problem is worth 5 points.}\]