Question 1

A capacitor is described by the characteristic curve $\ln(v^2) + \sinh^{-1}(\frac{q}{v^2}) = 0$**.**

(a) Is the capacitor linear?

(b) Is the capacitor time-invariant?

(c) Is the capacitor voltage-controlled?

(d) Is the capacitor charge-controlled?

(e) Is the capacitor passive?

(f) Find the voltage-current equation of the capacitor.

(g) Calculate the absorbed power of the capacitor.

(h) Calculate the absorbed energy of the capacitor during the time interval $[0, t]$.