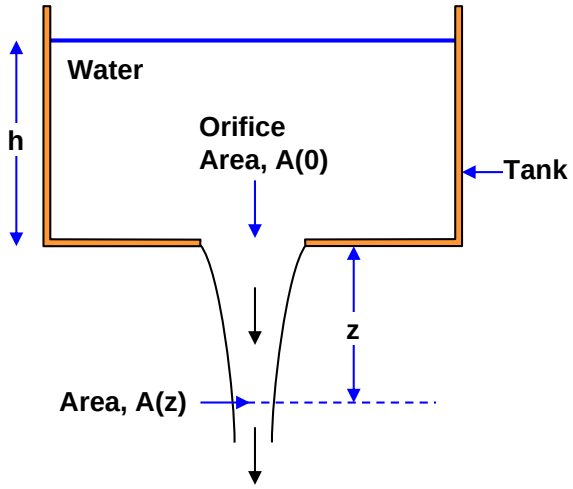
Problem 201A

A watertank has an orifice in the bottom of the tank:



The height, h, of water in the tank is kept constant by a supply of water which is not shown. A jet of water emerges from the orifice; the cross-sectional area of the jet, $A(z)$, is a function of the vertical distance, z. Neglecting friction (viscous effects) and surface tension find an expression for $A(z)$ in terms of $A(0)$, h and z where $A(0)$ is the cross-sectional area at $z = 0$. Assume that the area of the tank free surface is very large compared with $A(0)$.