Assignment 3

The fuel tank of a car is cylindrical in shape. The volume of the fuel tank is known to be 50 liters. The height and diameter of the fuel tank are 0.5 meters and 0.5 meters respectively.

1. What is the volume of the fuel tank?
   - The volume of the fuel tank can be calculated using the formula for the volume of a cylinder: $V = \pi r^2 h$, where $r$ is the radius and $h$ is the height.
   - Given that the radius $r = 0.5 / 2 = 0.25$ meters and the height $h = 0.5$ meters, we can calculate the volume as follows:
     - $V = \pi (0.25)^2 (0.5) = 0.19635$ cubic meters.
     - Since 1 cubic meter is equivalent to 1000 liters, the volume of the fuel tank is approximately 196.35 liters.

2. What is the mass of the fuel tank if the density of iron is 7850 kg/m³?
   - The mass of the fuel tank can be calculated using the formula $m = \rho V$, where $\rho$ is the density and $V$ is the volume.
   - Given that the density $\rho = 7850$ kg/m³ and the volume $V = 0.19635$ cubic meters, the mass is calculated as follows:
     - $m = 7850 \times 0.19635 = 1535.575$ kg.

3. What is the pressure inside the fuel tank if the atmospheric pressure is 100 kPa and the height of the fuel in the tank is 0.3 meters?
   - The pressure inside the fuel tank can be calculated using the formula $P = P_0 + \rho gh$, where $P_0$ is the atmospheric pressure, $\rho$ is the density of the fuel, $g$ is the acceleration due to gravity, and $h$ is the height of the fuel.
   - Given that the atmospheric pressure $P_0 = 100$ kPa, the density of the fuel $\rho = 7850$ kg/m³, the acceleration due to gravity $g = 9.81$ m/s², and the height of the fuel $h = 0.3$ meters, the pressure is calculated as follows:
     - $P = 100 + 7850 \times 9.81 \times 0.3 = 100 + 23434.5 = 24434.5$ kPa.

Diagram:

- A diagram illustrating the fuel tank with the dimensions mentioned.
- A cross-sectional view of the fuel tank showing the volume calculation.

Note: Details of the diagram are not visible in this text-based representation.