1) Estimate the depth in the ocean that the static pressure is 50% due to the water depth and 50% due to the air pressure above the water. Use $1G = 9.8 \text{ m/s}^2$ and $1\text{ g/cm}^3$ for the density of sea water, and $1\text{ atm}$ for the air pressure.

2) A MEMS submarine is being used to monitor the cooling fluid in an industrial transformer. The transformer fluid (liquid) has a density of $2 \text{ g/cm}^3$. The sub is in motion and measures the total pressure (1960.1 Pa) and the static pressure (1960 Pa) that it experiences, using gage pressure sensors. For $1G = 9.8 \text{ m/s}^2$, estimate the velocity of the sub in mm/s?

3) For the sub in (2), what is the depth of the sub in mm, ignoring atmospheric pressure?

4) For the pressure sensor diaphragm shown below, the four identical P-type piezoresistors have a gauge factor of +180:

![Pressure Sensor Diaphragm Diagram]

a. Under pressure, is each resistor in compression or tension?
b. Under pressure, has each resistor increased or decreased in resistance?

5) Estimate the acceleration level of a shock event of a 1Kg object falling 10m onto a hard surface where it completely stops moving 10ms after initial impact. ($1G = 9.8 \text{ m/s}^2$)