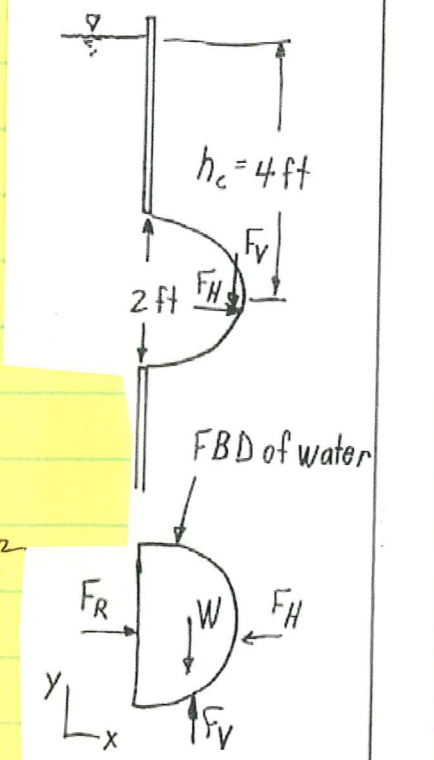
2.81

2.81 A 2-ft-diameter hemispherical plexiglass "bubble" is to be used as a special window on the side of an above-ground swimming pool. The window is to be bolted onto the vertical wall of the pool and faces outward, covering a 2-ft-diameter opening in the wall. The center of the opening is 4 ft below the surface. Determine the horizontal and vertical components of the force of the water on the hemisphere.



$$F_R = P_c A$$

$$= \gamma h_c A$$

$$= 62.4 \frac{lb}{ft^3} \times 4\ ft \times \frac{\pi}{4}(2)^2\ ft^2$$

$$= 784\ lb \rightarrow$$

$$F_V = \gamma V = 62.4 \times \frac{4}{3}\pi R^3 / 2$$

$$= 131\ lb \downarrow$$