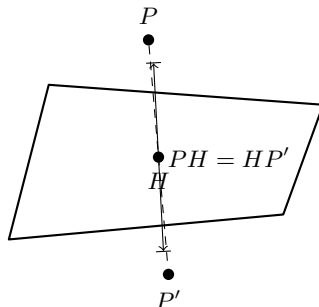


Question 4

Find the distance from $P = (4, -1, 5)$ to the plane $2x - y + 2z = 3$, the perpendicular foot H , and the reflection P' of P across the plane.

Question 4 – Solution

Strategy Move from P along the normal $\vec{n} = \langle 2, -1, 2 \rangle$.



Distance The signed numerator is $2(4) - (-1) + 2(5) - 3 = 16$, and $\|\vec{n}\| = 3$, so $d = 16/3$.

Foot For $H = P - \lambda\vec{n}$, impose the plane equation. Since $\lambda = 16/9$,

$$H = \left(4/9, 7/9, 13/9 \right).$$

Reflection Since H is the midpoint of PP' , $P' = 2H - P = \left(-28/9, 23/9, -19/9 \right)$.

Verification H satisfies the plane equation, and $P - H$ is parallel to $\vec{n}$.