9.5 The Distance from a Point to a Line in R^2 and R^3

Distance from a Point $P_0(x_0, y_0)$ to the Line with Equation $Ax + By + C = 0$

$d = \frac{|Ax_0 + By_0 + C|}{\sqrt{A^2+B^2}}$, where d represents the distance between point $P_0(x_0, y_0)$, and the line defined by $Ax + By + C = 0$, where the point does not lie on the line. But we don't really need this since the formula gives the correct value of 0 when the point does lie on the line.

Example 1: Determine the distance from point P(-6, 4) to the line $5x - 3y + 15 = 0$.

Example 2: Determine the distance from point P(15, -9) to the line $\vec{r} = (-2, -1) + s(-4, 3)$, $s \in R$.

Example 3: Calculate the distance between the two parallel lines 5x – 12y + 60 = 0 and 5x – 12y – 60 = 0

Distance, d, from a Point, P, to the line $\vec{r} = \overrightarrow{r_0} + s\vec{m}, s \epsilon R$**.**

In R^3, $d = \frac{|\vec{m}\times\overrightarrow{QP}|}{|\vec{m}|}$, where Q is a point on the line and P is any other point, both of whose coordinates are known, and $\vec{m}$ is the direction vector of the line.

Example 4: Determine the distance from point P(-1, 1, 6) to the line with equation $\vec{r}$ = (1, 2, -1) + t(0, 1, 1), t ∈ R.