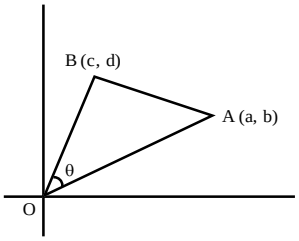
If the straight line joining the points (a, b) and (c, d) subtends an angle θ at the origin,

(A) $\cos\theta = \dfrac{\sqrt{a^2+b^2}}{\sqrt{c^2+d^2}}$ (B) $\cos\theta = \dfrac{\sqrt{c^2+d^2}}{\sqrt{a^2+b^2}}$

(C) $\cos\theta = \dfrac{ac-bd}{\sqrt{(a^2+b^2)(c^2+d^2)}}$ (D) $\cos\theta = \dfrac{ac+bd}{\sqrt{(a^2+b^2)(c^2+d^2)}}$

Solution



$$\cos\theta = \frac{OA^2+OB^2-AB^2}{2OA.OB} = \frac{(a^2+b^2)+(c^2+d^2)-\{(a-c)^2+(b-d)^2\}}{2\sqrt{a^2+b^2}\sqrt{c^2+d^2}}$$

$$\therefore \cos\theta = \frac{a^2+b^2+c^2+d^2-(a^2+b^2+c^2+d^2-2ac-2bd)}{2\sqrt{a^2+b^2}\sqrt{c^2+d^2}}$$

$$\therefore \cos\theta = \frac{ac+bd}{\sqrt{a^2+b^2}\sqrt{c^2+d^2}}$$

Hence, (D)