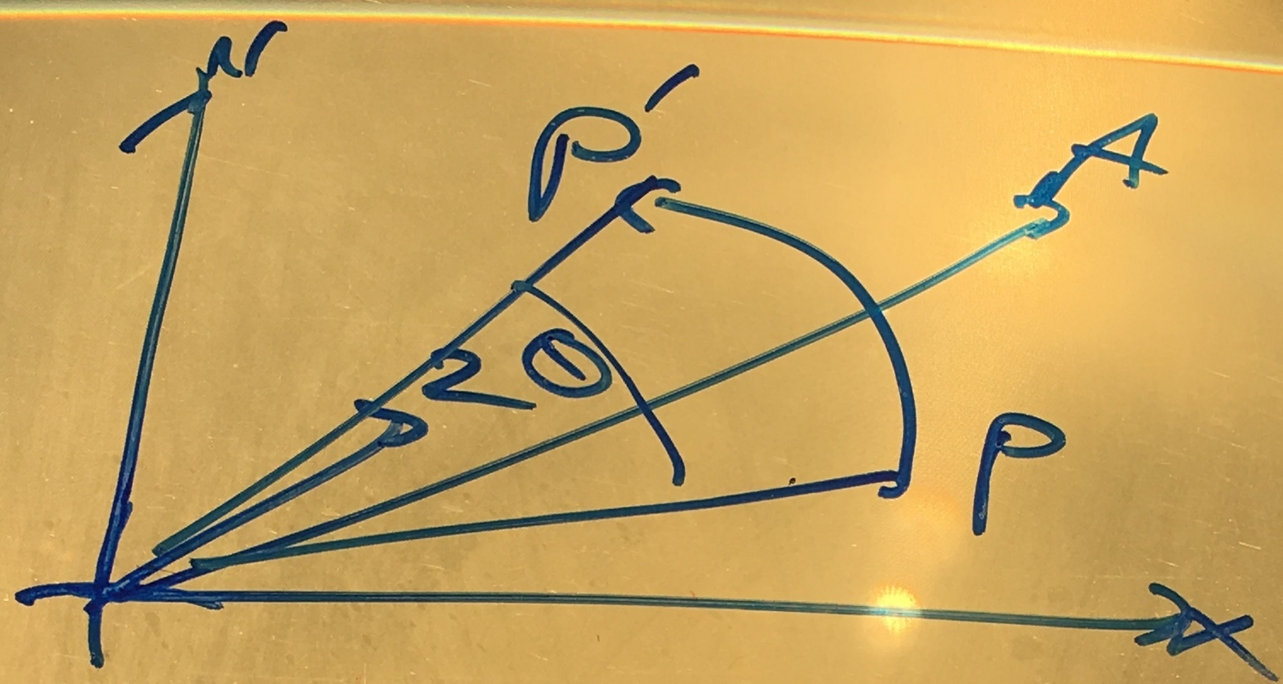


$|A|=1$

SIMPLE WHEN $P \parallel A$

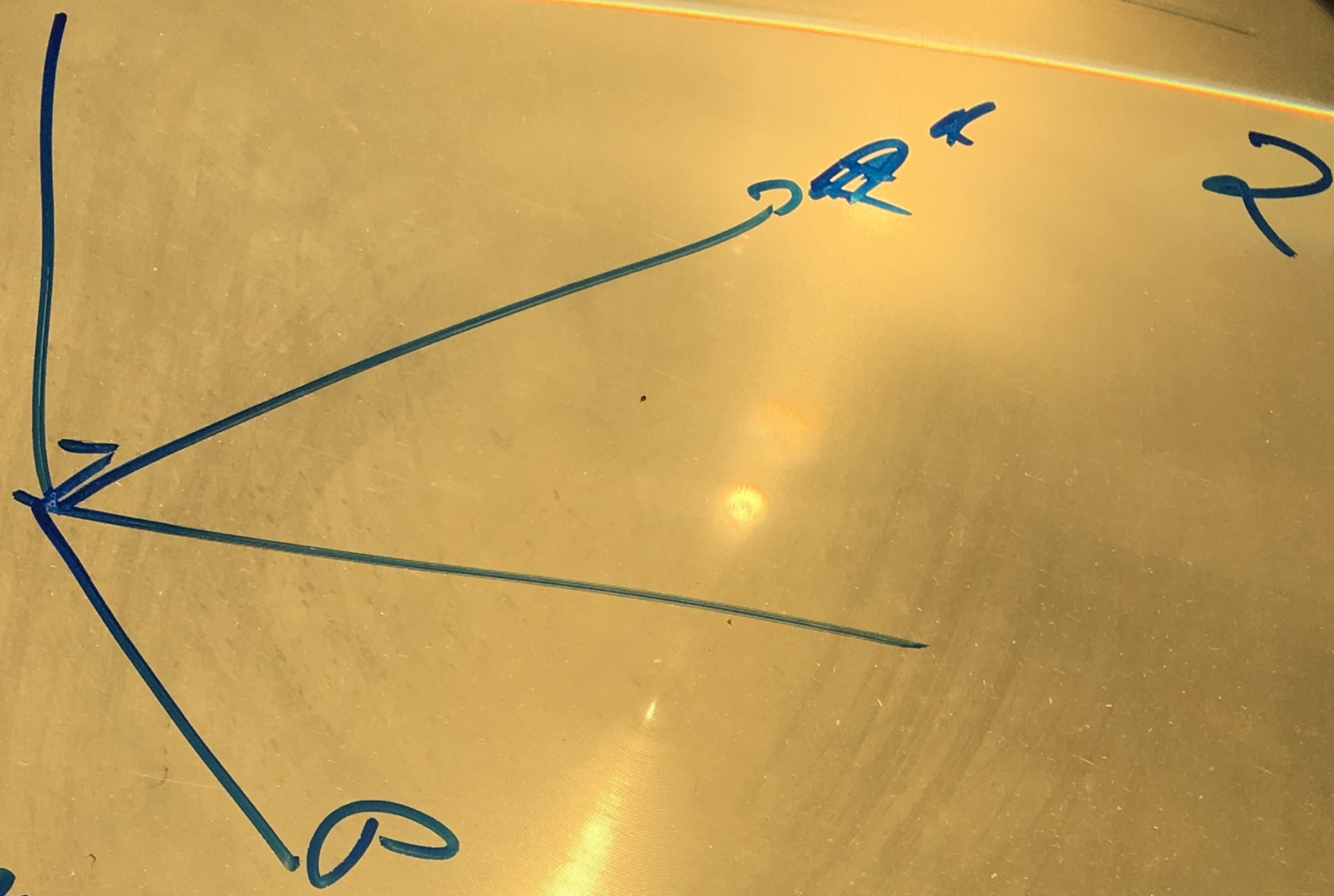
THEN. $P' = P$

EXAMPLE $A = (0,1,0)$

$P = (0,-5,0)$

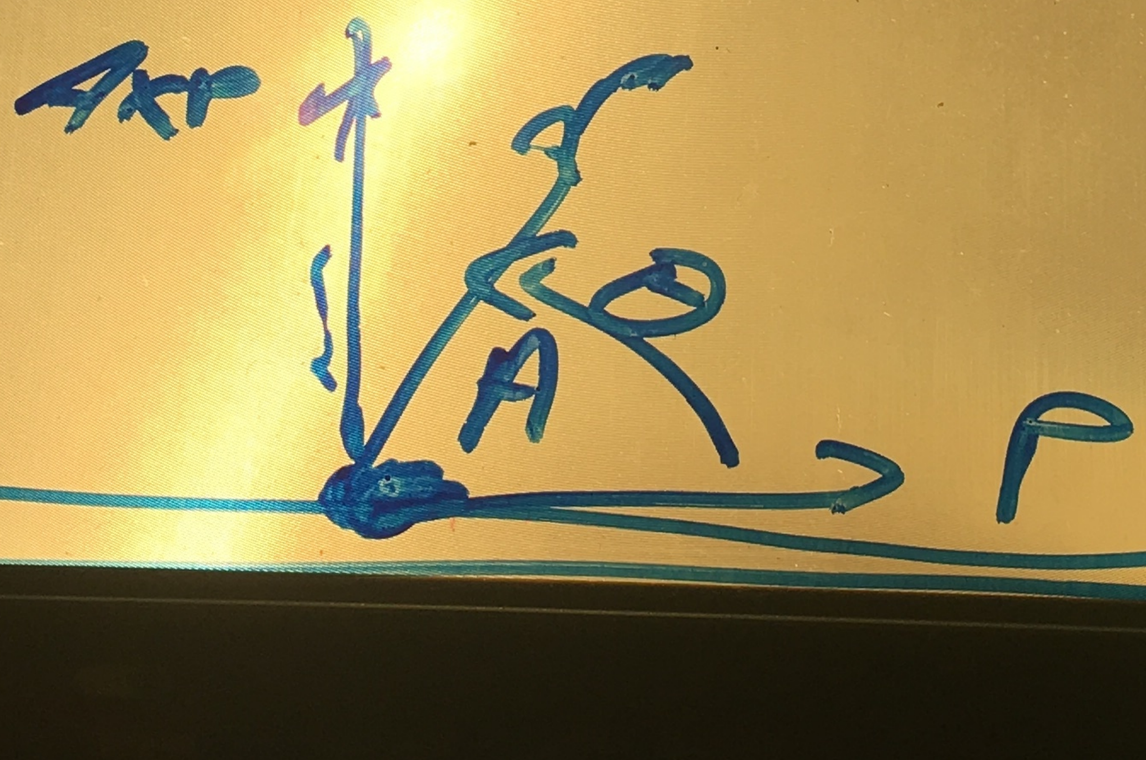
$\theta = 73.2°$

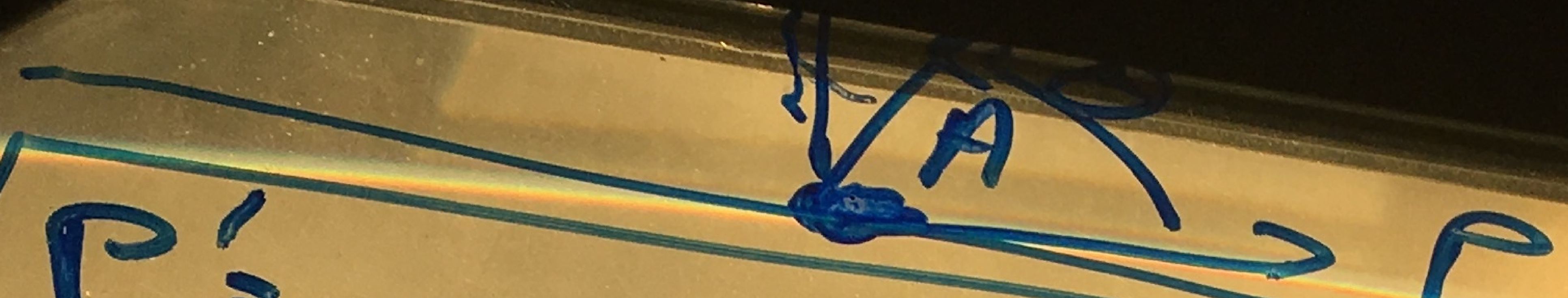
P'?



SIMPLE?: P | A)

THEN THIS IS 2D ROTATION.





$$\boxed{P' = \cos\theta \, P + \sin\theta \, A \times P}$$ 3

$A = (0\,0\,1)$ $P = (1\,0\,0)$

$A \times P = (0\,1\,0)$ $\theta = 45°$

$P' =$ ~~(.7, .7, .7)~~

$(.7, .7, 0)$

$P_{\parallel} = A \cdot P \, A$

$P_{\perp} = P - P_{\parallel}$

FOR GENERAL P, CUT P INTO 2 PARTS: $P = P_{\parallel} + P_{\perp}$

CHECK THAT $P_{\perp}$ IS $\perp$ TO A

$A \cdot P_{\perp} = A \cdot (P - A \cdot P \, A)$

$= A \cdot P - A \cdot P \, A \cdot A = 0$

GENERAL P, CUT P INTO
2 PARTS: $P = P_{\parallel} + P_{\perp}$
CHECK THAT $P_{\perp}$ IS $\perp$ TO A

$$A \cdot P_{\perp} = A \cdot (P - A \cdot P A)$$
$$= A \cdot P - A \cdot P \underbrace{A \cdot A}_{1} = 0.$$

$$P_{\parallel}' = P_{\parallel} = A \cdot P A$$

$$P_{\perp}' = \cos\theta \, P_{\perp} + \sin\theta \, (A \times P_{\perp})$$