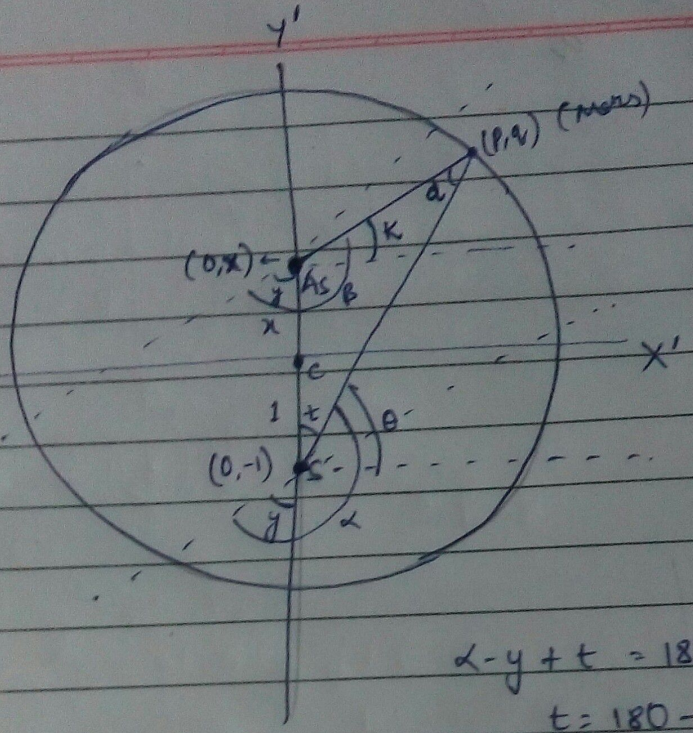
Q1 - i



α = Longitude

β = Mean Longitude

$\alpha - y + t = 180$

$t = 180 - (\alpha - y)$

$\theta = 90 - t$

$\beta - y + d + t = 180$

$d = \alpha - \beta$

$K + 90 - \beta + y = 0$

$K = \beta - 90 - y$

$\tan\theta = -\cot(\alpha - y)$, $\tan K = -\cot(\beta - y)$

$q - x = -\cot(\beta - y)(p - 0)$ | $q + 1 = -\cot(\alpha - y)(p - 0)$

$$p = \frac{1 + x}{\cot(\beta - y) - \cot(\alpha - y)} \quad , \quad q = \frac{x \cdot \cot(\alpha - y) + \cot(\beta - y)}{\cot(\alpha - y) - \cot(\beta - y)}$$

$r = \sqrt{p^2 + q^2}$

$$r = \frac{\sqrt{x^2(1 + \cot^2(\alpha - y) + 2x(1 + \cot(\alpha - y)\cot(\beta - y)) + 1 + \cot^2(\beta - y)}}{|\cot(\beta - y) - \cot(\alpha - y)|}$$