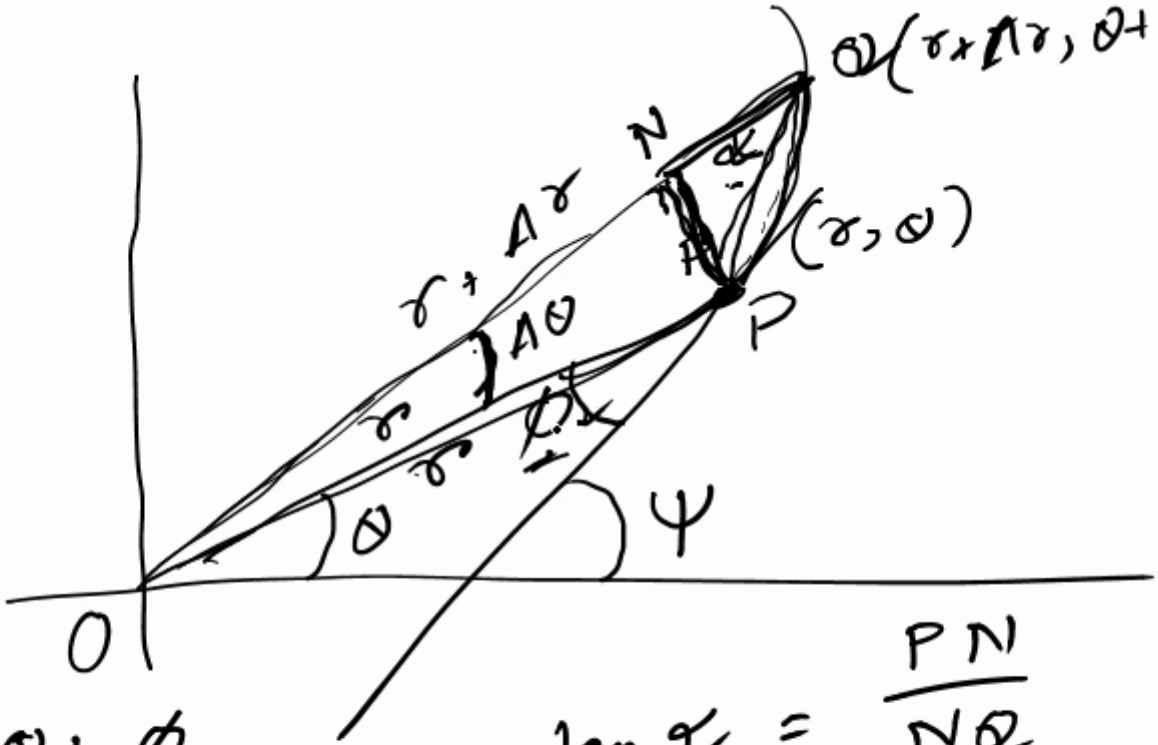
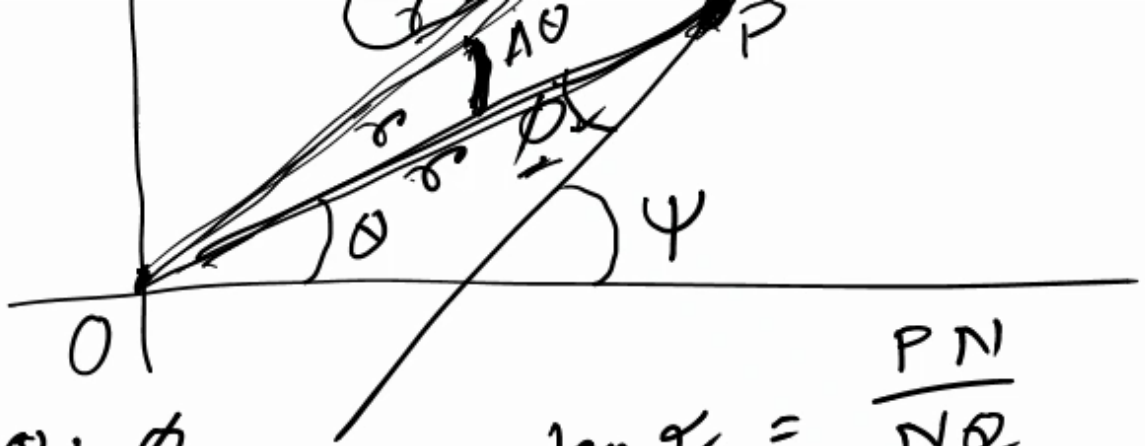


$\psi = \theta + \phi$

$\tan\alpha = \dfrac{PN}{NQ}$

$= \dfrac{r \sin\Delta\theta}{OQ - ON}$

$\dfrac{r \sin\Delta\theta}{r + \Delta r - r\cos\Delta\theta}$



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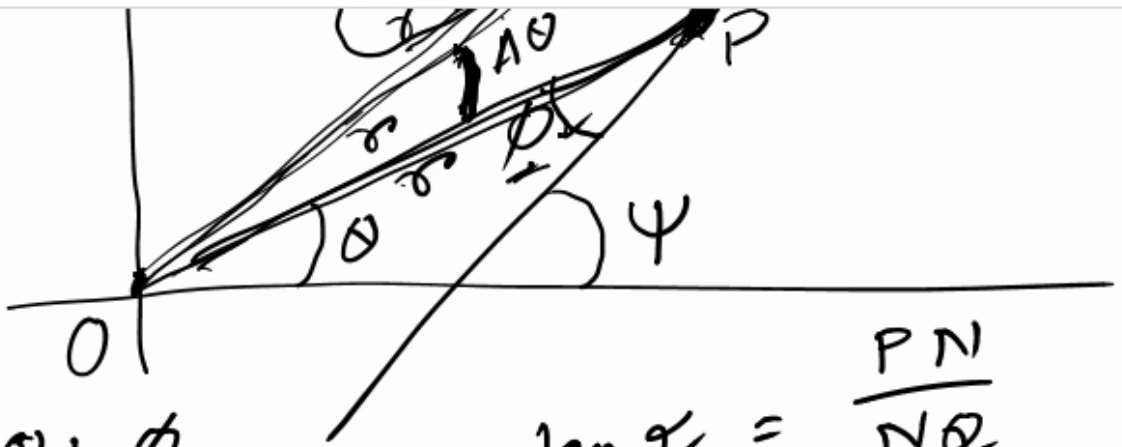
$\tan \psi = \dfrac{PN}{NQ}$

$= \dfrac{r \sin \Delta\theta}{OQ - ON}$

$= \dfrac{r \sin \Delta\theta}{r + \Delta r - r\cos\Delta\theta}$

$= \lim_{\Delta\theta \to 0} \dfrac{r \dfrac{\sin\Delta\theta}{\Delta\theta}}{\left(\dfrac{r - r\cos\Delta\theta}{\Delta\theta}\right) + \dfrac{\Delta r}{\Delta\theta}}$

$= \dfrac{r}{r_1}$



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$= \dfrac{r\left(\dfrac{\sin\Delta\theta}{\Delta\theta}\right)}{\left(\dfrac{r - r\cos\Delta\theta}{\Delta\theta}\right) + \dfrac{\Delta r}{\Delta\theta}}$

$\lim_{\Delta\theta \to 0}$

$= \dfrac{r}{\frac{dr}{d\theta}}$

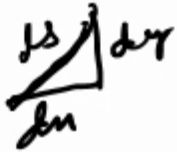
$\tan\phi = \dfrac{r}{\frac{dr}{d\theta}}$ $\quad \phi = \tan^{-1}\dfrac{r}{\frac{dr}{d\theta}}$

$$\psi = \theta + \phi = \theta + \tan^{-1}\frac{r}{r_1}$$

$$\frac{d\psi}{d\theta} = 1 + \frac{1}{1 + \frac{r^2}{r_1^2}} \cdot \frac{r_1^2 - r\cdot r_2}{r_1^2}$$

$$= 1 + \frac{r_1^2}{r_1^2 + r^2} \cdot \frac{r_1^2 - r r_2}{r_1^2}$$

$$= 1 + \frac{r_1^2 - r r_2}{r_1^2 + r^2} = \frac{r^2 + 2r_1^2 - r r_2}{r_1^2 + r^2}$$



$$x = r\cos\theta = f(\theta)\cos\theta$$
$$y = r\sin\theta = f(\theta)\sin\theta$$

$$\left(\frac{dx}{d\theta}\right)^2 = \left[f'(\theta)\cdot\cos\theta - \sin\theta\cdot f(\theta)\right]^2$$

$$\left(\frac{dy}{d\theta}\right)^2 = \left[f'(\theta)\sin\theta + \cos\theta\cdot f(\theta)\right]^2$$

$$dx^2 + dy^2$$

$$\frac{ds}{dy} = \frac{\frac{ds}{d\theta}}{\frac{dy}{d\theta}} = \frac{\sqrt{r^2 + r_1^2}}{\frac{r^2 + 2r_1^2 - rr_2}{r^2 + r_1^2}}$$

$$= \frac{(r^2 + r_1^2)^{\frac{3}{2}}}{r^2 + 2r_1^2 - rr_2}$$

Sequence :- A sequence in R is a sequence in real number This is function defined on a set of natural number $N = \{1, 2, 3 \ldots\}$ whose range is real number. R real no

function

$\{x_n\}_n = \left\{\frac{1}{2n} \quad n \in \mathbb{N}\right\}$

$\mathbb{N} = 1, 2, 3, \ldots$

$x_n = f(n)$

x_n : Real no

$f(n)$: Natural number

(1) (2) (3) (4) (5)

$\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}$

. .

Limit of a sequence :-

A sequence $\{x_n\}_n$ of real numbers is said to tend to a finite real number (2) if for any given positive number ϵ, there exists a positive integer n_0 (n_0 will usually depend on ϵ) such that for all $n \geq n_0$

$$|x_n - 2| < \epsilon$$

$\lim_{n \to \infty} x_n = 2$