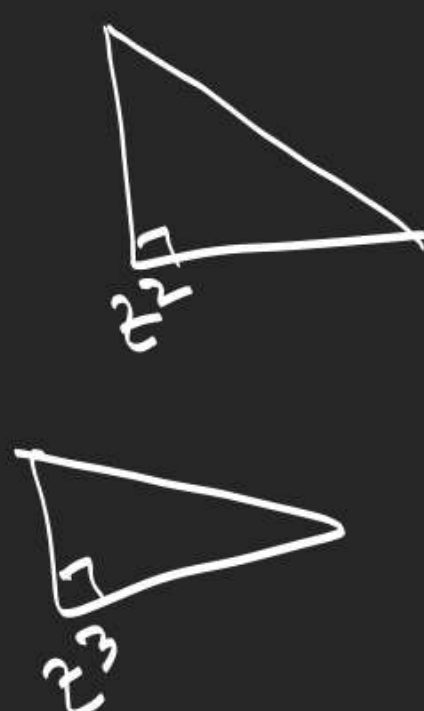


1. Find locus of  $z$  for which triangle with vertices  $z, z^2, z^3$  is right angled.



$$\frac{z^3 - z^2}{z - z^2} = -z \in P.I.$$

$$\frac{z - z^3}{z^2 - z^3} = \frac{1+z}{z} \in P.I.$$

$$-1/z + 1 = ik$$

$$z = \frac{-1-ik}{(-1)^2 + k^2}$$

$$x = -\frac{1}{1+k^2}, \quad y = \frac{-k}{1+k^2}$$

$$x^2 + y^2 = -x$$

Ans:  $x^2 + y^2 = -x$

2. Find the locus of point  $P(z)$  in complex plane

s.t.  $\left| z + \frac{1}{z} \right| = 2$

$$\left| z^2 + 1 \right|^2 = 4|z|^2 \Rightarrow (z^2 + 1)(\bar{z}^2 + 1) = 4|z|^2$$

$$\underline{|z|^4 - 4|z|^2 + 1 + z^2 + \bar{z}^2 = 0}$$

Monday  $\rightarrow$

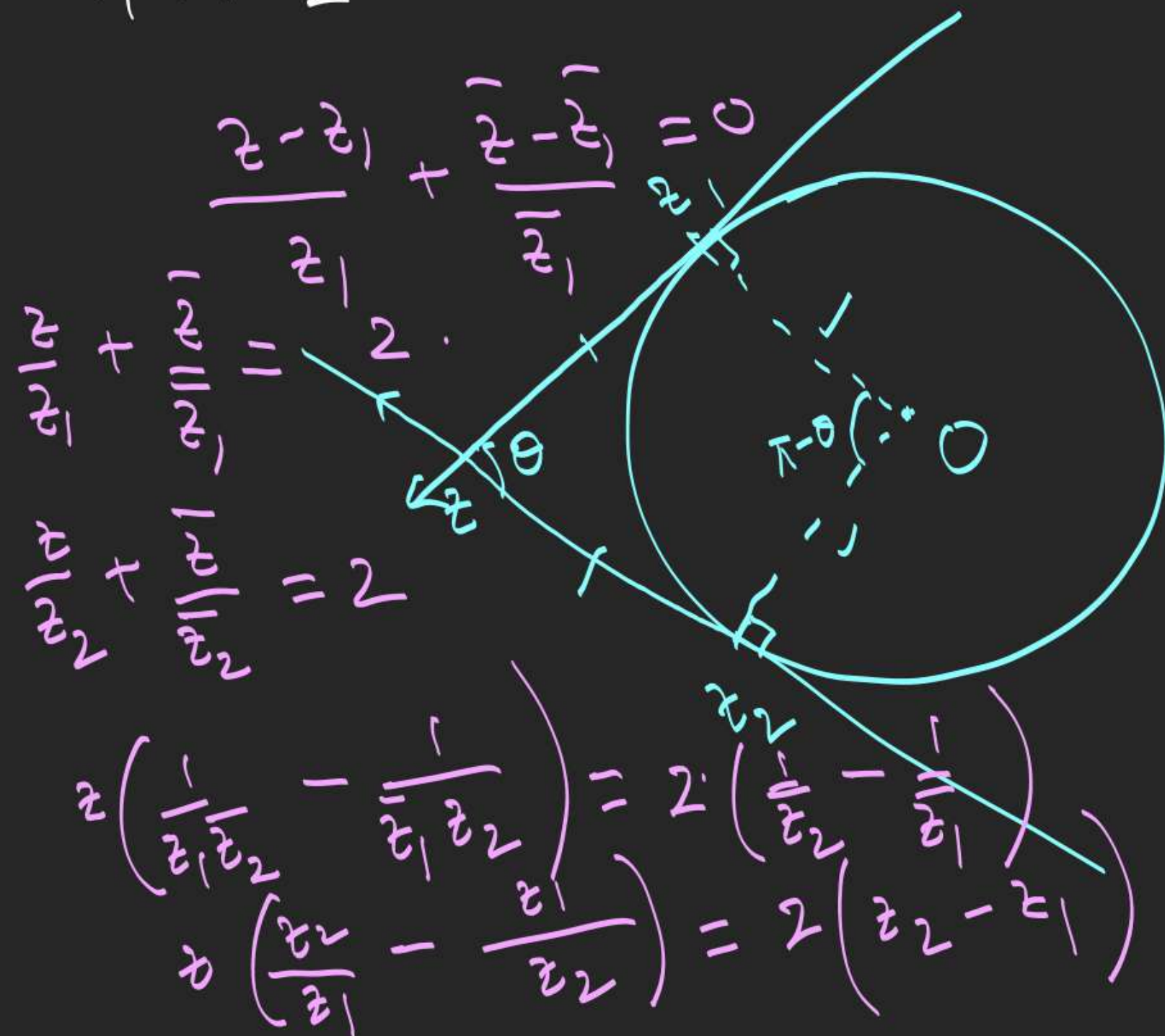
$$(z^2 - 1) - i(z - \bar{z}) = 0$$

$$(z\bar{z} - i(z - \bar{z}) - 1)(z\bar{z} + i(z - \bar{z}) - 1) = 0$$

Parabola  $\rightarrow$  (Ex-III) Complete  
 $\downarrow$   
 JEE Mains &  
 Advanced



3. Find the intersection <sup>point</sup> of tangents at points  $z_1$  &  $z_2$  on the circle  $|z|=r$  in terms of  $z_1, z_2$ .



$$z - z_1 = (z - z_2)e^{i\theta}$$

$$z_1 e^{i(\pi - \theta)} = z_2$$

$$\underline{-z_1 e^{-i\theta} = z_2}$$

$$-z_1(z - z_2) = z_2(z - z_1)$$

$$z = \frac{2z_1 z_2}{z_1 + z_2}$$