(a) This part of the question concerns inversion in the unit circle

$\mathcal{C} = \{ (x, y) : x^2 + y^2 = 1 \}$

Sketch $C_1 = \{(x, y): x=4\}$
$C_2 = \{ (x, y): (x-2)^2 + y^2 = 4\}$
on same diagram.

Sketch on a separate diagram, their images under inversion in $\mathcal{C}$.

You should indicate the coordinates of any points of intersections of images with $\mathcal{C}$.

[10]

(b) Find the Möbius transformation M that maps $z_1 = 1$ to 0, $z_2 = i$ to 1 and $z_3 = (2+i)$ to ∞

Describe the effect that M has on generalised circle $\mathcal{C}$ which passes through z_1, z_2, z_3.

Use the transformation M to decide whether $\mathcal{C}$ passes through $z_4 = 1-i$.

[15]