$M(2-i) = 0 = K((2-i)-m) \Rightarrow m = 2-i$

$M(1+3i) = 1 = K((1+3i)-(2-i))$

$1 = K(-1+4i) = K(-1+4i)\frac{(-1-4i)}{(-1-4i)}$

$(-1-4i) = K(17)$

$K = \frac{(-1-4i)}{17}$

$M(z) = \frac{(-1-4i)}{17}(z-2+i)$

check $M(2-i) = 0$

$M(1+3i) = \frac{(-1-4i)}{17}(1+3i-2+i) = \frac{(-1-4i)(-1+4i)}{17}$

$= 1$

If $z_3 = -1/2 + 9i$ is collinear with z_1 and z_2 $M(z)$ will map z_3 to the real axis.

$M(-1/2+9i) = \left(\frac{-1-4i}{17}\right)(-1/2+9i-2+i)$

$= \left(\frac{-1-4i}{17}\right)(-5/2+10i)$

$= \left(\frac{-1-4i}{34}\right)(-5+20i) = \frac{1}{34}(5-20i+20i+80)$

$= \frac{85}{34} = 5/2$

$\frac{23}{23}$

8/8

$M(z_3)$ is real so z_1, z_2 and z_3 are collinear.

3) $K: x^2+y^2+x-y+7/16=0$

equivalently $(x+1/2)^2+(y-1/2)^2 = 1/16$

K is a centre with centre $(-1/2, 1/2)$, radius $1/4$.

In the complex plane K is a circle with centre $\alpha = -1/2 + i/2$, radius $= 1/4$. In the complex plane therefore, K is a circle such that

$K = \{z : |z-(-1/2+i/2)| = 1/4\}$.

2/2