

Sample test answers

2008/2009

A) a) i)  $\operatorname{Im}(z_1) = -3$

ii)  $|z_1| = \sqrt{5}$

iii)  $|z_1 + z_2| = 2\sqrt{5}$

b) i)  $x^2 + (y + \frac{1}{2})^2 = 4$  : circle radius  $r=2$

center  $(0, -\frac{1}{2})$

ii) the point  $(0, -2)$

B)

a) The solutions are :  $z_k = 2^{\frac{1}{8}} e^{i\theta_k}$

where  $\theta_0 = \frac{3}{16}\pi$  ,  $\theta_1 = \frac{11}{16}\pi$

$\theta_2 = \frac{19}{16}\pi$  ,  $\theta_3 = \frac{27}{16}\pi$

c)  $f = \frac{z(1-i)z}{-(i+1)z + 2}$

d) a)  $f'(z) = \lim_{\Delta z \rightarrow 0} \frac{f(z+\Delta z) - f(z)}{\Delta z} \dots = iz$

b) C-R equations only hold at  $(0, 0)$ ,

$\frac{\partial u}{\partial x}$ ,  $\frac{\partial u}{\partial y}$ ,  $\frac{\partial v}{\partial x}$ ,  $\frac{\partial v}{\partial y}$  exist and are continuous

$\Rightarrow f$  is differentiable at  $z=0$