Work Sheet Week 4

C.1. $(1-2)x + 2y = 1$

$(2-1)x + 2y = 0$

$(2-1) = \varepsilon$

$-\varepsilon x + 2y = 1$

$\varepsilon x + 2y = 0$

The two lines are not parallell, which means there must be one and only one solution if the equations are continuous.

C.2 $ad = bc$

$\frac{a}{b} = \frac{c}{d}$

$ax + by = 0$

$by = -ax$

$y = -\frac{a}{b}x$

$y = -\frac{c}{d}x$

$dy = -cx$

$cx + dy = 0$

Given $ad = bc$, we can show the two equations as equal. Hence there are infinite solutions to the linear system.

C.3 $a, b, c, d \in \mathbb{C}$ $\lambda \in \mathbb{C}$

$ax + by = \lambda x$ $cx + dy = \lambda y$

$x(a-\lambda) + by = 0$ $cx + y(d-\lambda) = 0$

$x(a-\lambda) + by = cx + y(d-\lambda)$

$x(a-(-\lambda) = y(d-b-\lambda)$

$A = a - c - \lambda$ $B = d - b - \lambda$

$Ax = By$

This can be anywhere in the complex plane as long as A and B are of same magnitude.