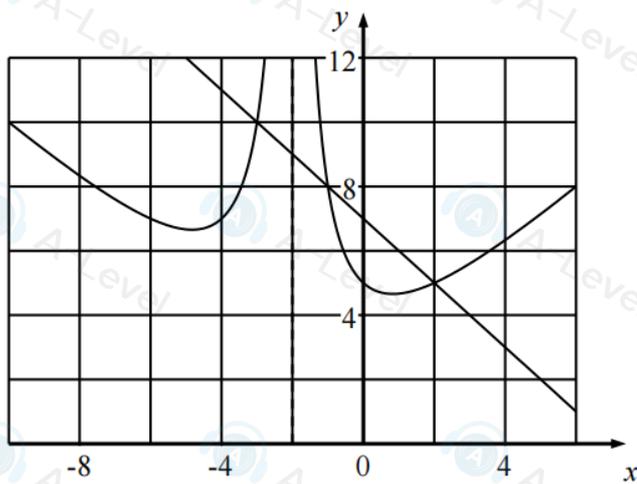


3



This sketch on its own scores no marks, but it may be seen in the work

$$\frac{x^2 + 3x + 10}{x + 2} = 7 - x$$

$$x^2 + 3x + 10 = 14 + 5x - x^2$$

$$x^2 - x - 2 = 0 \quad (x - 2)(x + 1) = 0$$

CVs 2, -1

$$\frac{-(x^2 + 3x + 10)}{x + 2} = 7 - x$$

$$-x^2 - 3x - 10 = 14 + 5x - x^2$$

$$8x = -24 \quad \text{CV } -3$$

$$x < -3 \quad -1 < x < 2$$

M1

dM1

A1A1

M1

A1

dddM1A1A1

[9]

7(a)	$z = (0+)iy \Rightarrow w = \frac{(1+i)iy + 2(1-i)}{iy-i} = \frac{-y+2+i(y-2)}{i(y-1)} = \frac{y-2+i(y-2)}{y-1}$	M1
	$\Rightarrow u = v$ or $\text{Im } w = \text{Re } w$	A1
		(2)
(b)	$w = \frac{(1+i)z + 2(1-i)}{z-i} \Rightarrow z = \frac{2(1-i) + iw}{w-1-i} = \frac{2-v+i(u-2)}{u-1+i(v-1)}$	M1
	$\frac{2-v+i(u-2)}{u-1+i(v-1)} \times \frac{u-1-i(v-1)}{u-1-i(v-1)}$ $= \frac{(2-v)(u-1) + (u-2)(v-1) + i((u-1)(u-2) - (2-v)(v-1))}{\dots}$	M1
	$\text{Im } z = 0 \Rightarrow (u-1)(u-2) - (2-v)(v-1) = 0$	
	$\Rightarrow (u-1)(u-2) - (2-v)(v-1) = 0 \Rightarrow u^2 - 3u + 2 + v^2 - 3v + 2 = 0$	A1
	$\Rightarrow \left(u - \frac{3}{2}\right)^2 + \left(v - \frac{3}{2}\right)^2 = \frac{1}{2}$	M1
	Centre is $\frac{3}{2} + \frac{3}{2}i$ and radius is $\frac{\sqrt{2}}{2}$	A1A1
		(6)

(8 marks)

Question Number	Scheme	Marks
2.	$\frac{6}{x-3} \leq x+2$	
	<b>Way 1</b>	
	$\frac{6}{x-3} \leq x+2 \Rightarrow x+2 - \frac{6}{x-3} \geq 0$	
	$x+2 - \frac{6}{x-3} \geq 0 \Rightarrow \frac{(x+3)(x-4)}{x-3} \geq 0$	Attempt to combine fractions and factorise the numerator
	$x = -3, x = 4$	Correct critical values
	$x \geq 4$	Follow through their 4
	$x = 3$	Identifies 3 as a critical value
	$-3 \leq x < 3$	M1: Attempt inside region A1: Correct inequality
		(7)
	<b>Way 2</b>	
	$6(x-3) \leq (x+2)(x-3)^2$ $\Rightarrow (x-3)(4-x)(x+3) \geq 0$	Multiplies both sides by $(x-3)^2$ and attempt to factorise
	$x = -3, x = 4$	Correct critical values
	$x \geq 4$	Follow through their 4
	$x = 3$	Identifies 3 as a critical value
	$-3 \leq x < 3$	M1: Attempt inside region A1: Correct inequality
		(7)
	<b>Way 3</b>	
	$x-3 > 0 \Rightarrow 6 \leq (x+2)(x-3)$ $\Rightarrow (x-4)(x+3) \geq 0$	Multiplies both sides by $(x-3)$ and attempt to factorise Must state $x-3 > 0$
	$x = 4$	Correct critical values
	$x \geq 4$	Follow through their 4
	$x = 3$	Identifies 3 as a critical value
	$(x-3 < 0) \Rightarrow 6 \geq (x+2)(x-3)$ $x = -3$	Correct critical value
	$(x+2)(x-3) \leq 6 \Rightarrow (x-4)(x+3) \leq 0$ $\Rightarrow -3 \leq x < 3$	M1: Attempt inside region A1: Correct inequality
		(7)