Question 4

(ICH-Paper I - 2015)

(25 marks)

(a) The complex numbers  $z_1, z_2$  and  $z_3$  are such that  $\frac{2}{z_1} = \frac{1}{z_2} + \frac{1}{z_3}$ ,  $z_2 = 2 + 3i$  and  $z_3 = 3 - 2i$ ,

where  $i^2 = -1$ . Write  $z_1$  in the form a+bi, where  $a, b \in \mathbb{Z}$ .

1			1	1	I	1		1	in similar	1	1	1	1	1	1				· · · · · · · · ·	1				1	I	1		r		[
	•		- Contraction									1					-													
	and a second	a mana w	-				-						-				1 Contractor													
					1					1						1			******									-		·
					-		-	ļ	ļ	ļ		******				-								]						-
		1											1																	1
ł	l							-		-							1													
			-								-	-	1		for an annual second	-	1		a a contra contra analar a	a	1999 - 1977 - 1979 - 1999	* ** i	y nya ina kangala k						Ano 10 1 1 1 1 1 1	
				ļ	-												-													
													PA																	
			1	1			1	1								1														
•••••••••••••••••••••••••••••••••••••••					-								-		17411948 (4.1444)														_	
				1	L								1																	
		-	Concernant of																											
******		1		•		A South rate and	-				1.4								i dago gina a sina ang si s									1 may 1 mar 1 mar 4	1.1.1.4.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	
				-			Į				C																			
			-								1447-b. 17444-b.b.																			
		Constant and the	and the second se																											
harman an a		1 (1974)	1. pro 100 - 10 - 10 - 10				-								1 al - Profile (B) - 1 - 1	N		19	a							-				5
			-																											
																											the second s			
			1																											
and the second se			1					14 - 14 - 14 - 14 - 14 - 14 - 14 - 14 -	an fan i	1				141-1444 - 17-194 (P	Participante ( Age	1 An An - An	Arra 1. 11 Age 1.		* ****			1				*******				
110 to 10 to 10	() <b>18</b> (10)		-	and and the set		1971-1			and a set of the set o						a (1997), and a (1997)								Net Serve						1	
		Constraint Service	101111111																											
			-						000000000000000000000000000000000000000	*)*(*********																				
		t.	-																											
																					-		and the second se							
			1						0./iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	*****												-					i.			
L			-																		l				l					

(b) Let  $\omega$  be a complex number such that  $\omega^n = 1$ ,  $\omega \neq 1$ , and  $S = 1 + \omega + \omega^2 + \dots + \omega^{n-1}$ . Use the formula for the sum of a finite geometric series to write the value of S in its simplest form.

