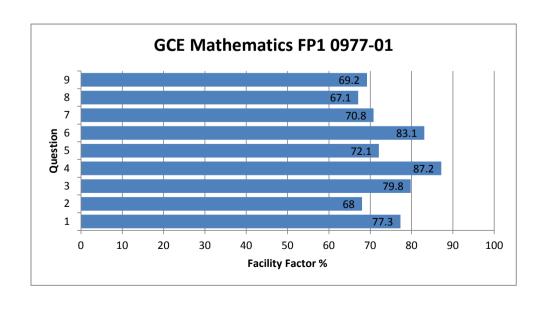


## WJEC 2014 Online Exam Review

## GCE Mathematics FP1 0977-01

All Candidates' performance across questions

?	?	?	?	?	?	?	_
Question Title	N	Mean	SD	Max Mark	F F	Attempt %	
1	326	7.7	2.6	10	77.3	99.7	
2	323	4.8	1.9	7	68	98.8	
3	324	6.4	2.1	8	79.8	99.1	]
4	327	5.2	1.2	6	87.2	100	$\leftarrow$
5	320	7.2	2.8	10	72.1	97.9	$\leftarrow$
6	324	7.5	2.2	9	83.1	99.1	
7	317	6.4	2.9	9	70.8	96.9	$\leftarrow$
8	319	4.7	2.2	7	67.1	97.5	$\leftarrow$
9	317	6.2	2.7	9	69.2	96.9	



2

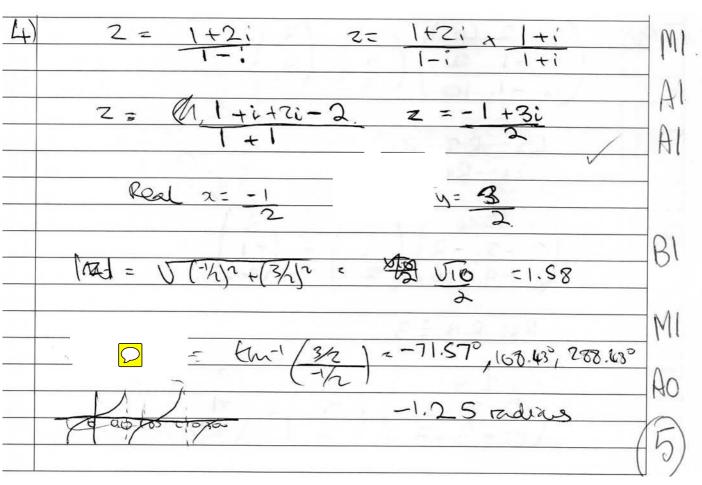
**4.** The complex number z is given by

$$z = \frac{1+2i}{1-i}.$$

Find the modulus and the argument of  $\emph{z}$ .

[6]

4)	2= 1+2i 2= 1+2i + 1+i
	Z = (1, 1+i+2i-2, z = -1+3i)
	Real $x=-1$ $y=3$ $2$
	12d = 5 (-4)2+(3/1)2 = 1.58
	= \land \lan
	-1.25 radius



**5.** The roots of the cubic equation

$$x^3 + 2x^2 + 2x + 3 = 0$$

are denoted by  $\alpha$ ,  $\beta$ ,  $\gamma$ .

(a) Find the cubic equation whose roots are  $\beta\gamma$ ,  $\gamma\alpha$ ,  $\alpha\beta$ .

[6]

(b) Show that

$$\alpha^2 + \beta^2 + \gamma^2 = 0.$$

Deduce the number of real roots of the cubic equation

$$x^3 + 2x^2 + 2x + 3 = 0,$$

justifying your answer. [4]

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56

Gad

$$=-2^2-2(2)$$
  $1-2^2-2(2)$   $1-2^2-2-2(2)$ 

The roots aguered have a sum of 0; this moons there ever the equation which are equale as to have a sum of 0; this moons which are equale as to have a sum of 0; this moons

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Gad 56) x2+ B2+ 82 = (a+ B+ 8)2 1.6 = 8 101 7 11 7 11 7 = x2+02+22+5(00+02+02) (0+0+8)= 02+02+02+02+02+02+02+02+02=  $\chi^2 + \Lambda^2 + \Gamma^2 = (\alpha + \Lambda + \delta)^2 - 2(\alpha R + \Omega \Gamma + \alpha \delta)$ = 0 as required. The roots agreed have a sum of 0; this moons there are the real roots of the equation \$0 which are equale as 12 4ac = 0 mouns ATTENDED + S (MOD) - " ST = MARINE LUTER STORE

- 7. The transformation T in the plane consists of a clockwise rotation through 90° about the origin, followed by a translation in which the point (x, y) is transformed to the point (x + 1, y + 2), followed by a reflection in the y-axis.
  - (a) Show that the matrix representing *T* is

$$\begin{bmatrix} 0 & -1 & -1 \\ -1 & 0 & 2 \\ 0 & 0 & 1 \end{bmatrix}.$$
 [5]

(b) Find the equation of the image under T of the line y = 2x + 1. [4]

Cwestiwn			
7	T=> Rotation	Translation	Reflection
	200270 - sin 270 0 sin 270 cos 270 0	012	200180 2in 180 0  sin 180 - 200180 0
	[ 0   0 ] -1 0 0 ] [ 6 0	012	0 0 0
	T = [-1 0 0]	0 1 2 0 0	0
	$\begin{bmatrix} -1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$	0 1 0 0 0 -1	-1 -1 0 2 0 1
12	->c+2=x	Y = 2x + 1 $2x - 2x + 1$ $-2x + 2x + 1$	
		-7c + 2 = -2y - 1 $-2c - 2y - 3 = 0$	

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7) T=> Rotation	Translation	Reflection
605270 -sin280	[(01)	1 9
Si-222 - 270 O	012	cos180 sin 180 0
2in 270 cos 270 0		sis 180 -cos 180 0
	001	0 0 1
[010]	[101]	[-1 0 0]
010	012	010
601	001	
		001
T = [-1 0 0]	0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	٥٦
0 10 .	0121.10	0 /
001	001 00	1
	, , , , , , , ,	
= [-1 0 -1]	0 10 0	-1 -1] /
	-100 = -1	0 2
001	0010	0 1 /
12) - 10 - 1 = X / )	/ - 7 × 1 )	//
17) - ty - 1 = x / > ->c + 2 = x / -> ->c + 2 = x / ->	- 27 7 1	
7 72	0: 127 2	
	(12 7 )	
	2 2 2	
	-24-3=0	
	111221 131	
	FILM FIRM	
	Line Co.	A Carrier Carrier
10		Re I To The Total
		T
		1 - V - L

8. Using mathematical induction, prove that

$$\sum_{r=1}^{n} (r \times 2^{r-1}) = 1 + 2^{n} (n-1),$$

for all positive integers n.

[7]

8. $\int_{-\infty}^{\infty} (1 \cdot 2^{-1})^{2} = 1+2^{n}(n-1)$ .  Assume that $n=k$ is true for all $a$ $n \in 2^{+}$ . $\frac{k}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \right).$ Assume true for $n=k+1$ if $h=k$ is true $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \cdot \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{n} \cdot \frac{k}{n} \right) = 1+2^{n} \left( \frac{k}{n} \cdot \frac{k}{n} \cdot \frac{k}{n} \cdot \frac{k}{n} \right).$ $\frac{k+1}{n} \left( \frac{k}{n} \cdot \frac{k}{$	Õ.			
Assume that $n=k$ is true for all $a$ $n\in z^{+}$ . $ \frac{k}{2} (k-z^{+}) = 1+2(k-1). $ Fill  Assume true for $n=k+1$ if $h=k$ is true $ \frac{k+1}{2} (k-1) = 1+2(k). $ Fill $ \frac{k+1}{2} (k-1) = 1+2(k-1) + (k+1) \times 2^{k}. $ $ = 2k \cdot 2^{k} + 1 $ $ = 1+2^{k+1} \cdot (k) $ When $n=1$ $ \frac{k+1}{2} = 1+2^{k} \cdot (1-1) = 1 $ $ \frac{k+1}$	8. n r-	$) = 1 + 2^{n} (n-1)$		A PARE S
Assume true for $n=k+1$ if $h=k$ is true  Assume true for $n=k+1$ if $h=k$ is true $ \begin{array}{cccccccccccccccccccccccccccccccccc$	r=1	/ //- (//-//.		
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Assume true for $n=k+1$ if $h=k$ is true $ \begin{array}{cccccccccccccccccccccccccccccccccc$			XT-IPTEXTENT	
Assume true for $n=k+1$ if $h>k$ is true $ \begin{array}{cccccccccccccccccccccccccccccccccc$	· + ( t	$2^{1-1}) = 1+2^{1}(K-1)$		
Assume true for $n=k+1$ if $h=k$ is true $ \begin{array}{cccccccccccccccccccccccccccccccccc$				
$\frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K+1} (k).$ $\frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K} (k-1) + (k+1) \times 2^{K}.$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K} (k-1) + (k+1) \times 2^{K}.$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K} (k)$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K+1} (k)$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K+1} (k).$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1 + 2^{K} (k).$ $= \frac{1}{2} \left( f \cdot g^{-1} \right) = 1$				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Assume true	for n=K+1 if h=k	: 13 true	
F=1 $F=1$				
F=1 $F=1$	÷	Z (4.5) = 1+2	(k).	
$= 2k \cdot 2^{k} + 1$ $=  +2^{k+1} \cdot (k) $ $\stackrel{?}{\sim} \text{ when }  +1 $ $RHS =  +2^{l} \cdot (1-1) = 1 $ $LHS =  \cdot 2^{l-1} =  \times  = 1$ $\therefore \text{ h=k is true for all positive integers.}$ Therefore the equation is true for all positive integers.		r=	PARKER	
$= 2k \cdot 2^{k} + 1$ $= 1 + 2^{k+1} \cdot (k)$ $\stackrel{?}{\sim} \text{ when } k = 1$ $RHS = 1 + 2^{l} \cdot (1 - 1) = 1$ $LHS = 1 \cdot 2^{l-1} =  X  = 1$ $\therefore h = k \text{ is true for all passible integers.}$ Therefore the equation is true for all passible integers.	K+1	r-1, K,	, k.	
$= 2k \cdot 2^{k} + 1$ $= 1 + 2^{k+1} \cdot (k)$ $\stackrel{?}{\sim} \text{ when } k = 1$ $RHS = 1 + 2^{l} \cdot (1 - 1) = 1$ $LHS = 1 \cdot 2^{l-1} =  X  = 1$ $\therefore h = k \text{ is true for all passible integers.}$ Therefore the equation is true for all passible integers.	2 ( # · 12	$(-1)^{-1}$	(K+1)×2	
$= 2k \cdot 2^{k+1}$ $=  +2^{k+1} \cdot (k)$ $\stackrel{\circ}{\times} : \text{ when } h=1$ $RHS =  +2^{l} \cdot (1-1)=1$ $LHS =  \cdot 2^{l-1} =  \times  = 1$ $\therefore \text{ True for } n=1$ $\therefore h=k \text{ is true for add } p \text{ and } h=k + 1 \text{ is also tree}.$ Therefore the equation is true for all positive integers.		- <del>*</del> 1+ 2 K	K-2K+2K.	
= $ +2^{k+1}\cdot(k) $ * When $ +-1 $ RHS = $ +2^{k}\cdot(1-1)  =  $ LHS = $ +2^{k+1}\cdot(1-1)  =  $ True for $ +-1 $ $ +-1 $ Therefore the equation is true for all positive integers.  Therefore the equation is true for all positive integers.				
= Hz <sup>k+1</sup> . (K)  ** When h=1  RHS = I+z!·(1-1)=1  LHS = I·z! <sup>-1</sup> = 1×1=1  True for n=1  h=k is true for all positive integers.  Therefore the equation is true for all positive integers.		= 2V 2 +1		
RHS = I+z!(I-I)=    LHS = I · z!-! =   x  =    True for n=   h=k is true for att p and h=kn is also true.  Therefore the equation is true for all positive integers.				
RHS = $1+2^{l} \cdot (1-1)=1$ LHS = $1\cdot 2^{l-1}=1\times 1=1$ True for $n=1$ Therefore the equation is true for all positive integers.  Therefore the equation is true for all positive integers.		= 1+2"·(K)		
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LHS = 1.2 <sup>1-1</sup> = 1×1=1  True for n=1  h=k is true for all positive integers.  Therefore the equation is true for all positive integers.	4			
h=k is true for all possibile integers.  Therefore the equation is true for all possibile integers.	RHS = 1+2	2-(1-1)=1		
h=k is true for all positive integers.  Therefore the equation is true for all positive integers.	LHS = 1.	21-1 = 1×1=1		
h=k is true for all positive integers.  Therefore the equation is true for all positive integers.				79.J
h=k is true for all positive integers.  Therefore the equation is true for all positive integers.	-:- True -	or n=1		
Therefore the equation is true for all positive integers.				
Therefore the equation is true for all possible integers.	: h= K i	s true for all p	and h= k+1 is ods	o trave.
	Therefore	the equation is t	rue for all positive	integers.