OCTOBER 2012 MATHEMATICS F

Question 1

Given the complex numbers, $Z_1 = 3\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)$ and $Z_2 = 3\left(\frac{\sqrt{2}}{2} + \frac{i\sqrt{2}}{2}\right)$. 1-Give the trigonometric form of the following complex numbers Z_1 ; Z_2 and $\frac{Z_1}{Z_2}$

2-Prove that for all integers n; Z^{12n} is a real number.

3-What are the real values of the $cos \frac{5\pi}{12}$ and $sin \frac{5\pi}{12}$.

Question 2

Find the particular solution of the following differential equation 4f(x) - 4f(x) + f(x) = 0 such that f(0) = 4 and the tangent to the curve of f at the point with x = 2 is horizontal. Question 3 Solve for (x, y) the following system in the set of real numbers:

Solve for (x, y) the following system in the set of real numbers:

 $\int x^2 + y^2 = 145$

 $\int \ln x + \ln y = \ln 72$

Question 4

Given the line *L*: y = 2x + 4 and the circle, $x^2 + y^2 - 4x - 6y - 12 = 0$.

1-The points of intersection of the line and the circle are;

a) A(-2; 0); B(2; 8) b) A(2; 0); B(-2; 8) c) A(-2; 8) B(0; 8) d) A(0; -2); B(8; 2)2-The length of the cord cut off is

a) $4\sqrt{5}$ b) $5\sqrt{4}$ c) $\sqrt{68}$ d) 8 Outstion 5

Question 5

Given the function, $f(x) = (2x^2 - 7x + 7)e^x$. Choose the correct answer.

$$1-\lim_{x \to -\infty} f(x) = 0; \ \lim_{x \to +\infty} f(x) = +\infty; \ f\left(-\frac{1}{2}\right) = \frac{9}{\sqrt{e}}$$

2-
$$\lim_{x \to -\infty} f(x) = -\infty; \quad \lim_{x \to +\infty} f(x) = 0; \quad f\left(-\frac{1}{2}\right) = \frac{9}{\sqrt{2}}$$

3-The function f is positive and increasing in $\left|-\infty; -\frac{1}{2}\right|$

- 4-The function f is negative and increasing in [2; $+\infty$ [
- 5-The minimum of the function f is 0
- $6-f(x) \ge -e^2; \forall x \in \mathbb{R}.$

SESS	ION: 2012						
EXERCIS E 1(1.5+1+1.5=4marks)							
If $\int_0^{\pi/2} \cos^n(t) dt, \forall n \ge 1$							
a) Calculate I_0 , I_1 and I_2							
b) Show that $\forall n \ge 2$, one has $nI_n = (n - 1)$	$I)I_{n-2}$,						
c) Deduce the value of $I_n \ \forall n \ge 1$							
EXERCISE 2(4marks)							
Study the continuity	of	the		follow	ing		function,
$f(x) = \begin{cases} x^2, x \le 0\\ x, 0 < x < 2\\ 4 - x, x \ge 2 \end{cases}$ 2) Show that the function g is continuous and of G(x) = $\begin{cases} e^{1/x}, x < 0\\ 0, if x = 0 \end{cases}$	differentiab	le and	its c	lerivativ	e is co	ontinuc	bus
$(\cos(x) - 1, if x > 0$							
EXERCISE 3(marks)							
One gives $E(X) = 2$, find	X=x	0	1	2	3	4	
a) The value of p and q,b) Vary(<i>X</i>),	P(X=x)	0.1	p	0.25	q	0.05	
c) The average and the variance of $Y=5X+7$.							

EXERCISE 4(9marks)

Part 1 (6marks)

Let f be the function defined on R by $f(x) = \frac{3(x-1)^3}{3x^2+1}$ and let C its curve representative in the plane brought back to an orthogonal reference mark of unit 1cm.

1)Show that there exist a single triplet (amebic), that one will determine such as for any real

$$f(x) = ax + b + \frac{CX}{3x^2 + 1}$$
,

2) Determin the limits of f at $+\infty$ and

 $-\infty$. 3)Show that f is differentiable and calculate its derivative. 4) Draw the table of variation of f 5) Show that that the curve (C) has as asymptote oblique the line (D) of equation y = x - 3

6) Study the relative positions of (C) and (D)

7) Give the equation of tangent (T) to (C) at the point of x-coordinate 0. Trace (D),(T) and (C)

8) Show that the curve has a centre of symmetry

9) Show that the equation f(x) = 1 has single solution in IR one note α this solution.

10) Give the approximate value of α to 10^{-2} nearby excess.

Annales brainprepa

Part 2 (3marks)

One considers the function g defined on IR by: $g(x) = \frac{3(\sin(x)-1)^3}{3\sin^2 x+1}$

1) Show that g is differentiable on IR and calculate g'(x)

2) Draw the table of variation of g on $|-\pi;\pi|$

3) Plot on a new drawing the curve representative of g.

AUGUST 2011 CS(maroua)

Exercise 1 (10mks)

a) Solve the system of equations $\begin{cases} log(x^2 + y^2) = 1 + log8\\ log(x + y) - log(x - y) = log3. \end{cases}$ where $= \frac{lnx}{ln10}$.
b) Show that: $1 - \cos\left(\frac{3}{2}\pi - 3\alpha\right) - \sin^2\frac{3}{2}\dot{a} + \cos^2\frac{3}{2}\dot{a} = 2\sqrt{2} \cdot \cos\frac{3}{2}\dot{a} \cdot \sin\left(\frac{3}{2}\dot{a} + \frac{\delta}{4}\right)$.
c) Solve the inequation $(\log_2(x))^4 - \left(\log_{\frac{1}{2}}\left(\frac{x^3}{8}\right)\right)^2 + 9 \cdot \log_2\left(\frac{32}{x^2}\right) < 4 \cdot \left(\log_{\frac{1}{2}}(x)\right)^2$,
where $\log_a(b) = \frac{\ln(a)}{\ln(b)}$.
d) Evolution $C = \begin{pmatrix} \frac{1}{a+a\overline{4}b\overline{2}+b\overline{2}a\overline{4}+b^2}{1} (\sqrt[4]{a}+\sqrt{b}) + \frac{3\sqrt{b}(a\overline{2}-b)}{a^{-\frac{1}{4}}(a\overline{4}-\sqrt{b})} \\ \frac{1}{a^{-\frac{1}{2}+2a\overline{4}b\overline{2}+b}} (\sqrt[4]{a}+\sqrt{b}) + \frac{3\sqrt{b}(a\overline{2}-b)}{a^{-\frac{1}{4}}(a\overline{4}-\sqrt{b})} \end{pmatrix}^{-\frac{1}{3}}$

d) Evaluate

Exercise 2 (10mks)

Consider, $P(z) = z^3 - (4+3i)z^2 + (1+9i)z + 2 - 6i$.

 $\left(\sqrt[4]{a}+\sqrt{b}\right)^{-1}$

1) Show that there exist $z_0 \in IR$ and $z_1 \in IR$ which verify $P(z_0) = P(z_1) = 0$.

2) Find the complex number z_2 such that $P(z) = (z - z_0)(z - z_1)(z - z_2)$.

3) Let A, B, and C three points of the plane $z_0 = z_A$, $z_B = z_1$, and $z_C = z_2$.

a) Find the nature and the characteristical elements of the transformation s of the plane such that S(A) = B and S(B) = C.

b) Find S(D) where D is the straight line defined by: 4x - 2y + 1 = 0.