UNIVERSITAS NEGERI YOGYAKARTA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
Alamat: Karangmalang , Yogyakarta 55281,Telp. 5548203 HP. 081578984400

SOAL UJIAN AKHIR SEMESTER GASAL TAHUN AJARAN 2014/2015

Mata Kuliah	: Complex Analysis	Pengampu	:Hartono
Kode Mata Kuliah	: MAA326	Hari/Tanggal Ujian	: Kamis, 8-1-2015
Prodi/Kelas	: Pmat/Internasional 2011	Waktu	: 13.00 - 14.40 (100')
Semester	: VII	Ruang Ujian	: D07.310

SIFAT UJIAN : OPEN BOOKS

Problem 1 (30)

Find the principal root of $(-8 + 8i\sqrt{3})^{1/4}$.

Problem 2 (40)

Give two examples of complex function which satisfy the Cauchy-Riemann condition but they do not have a derivative at a point.

Problem 3 (30)

Evaluate $\int_C f(z)dz$, where C is an unit circle with positive orientation and $f(z) = (z+1)/z$.

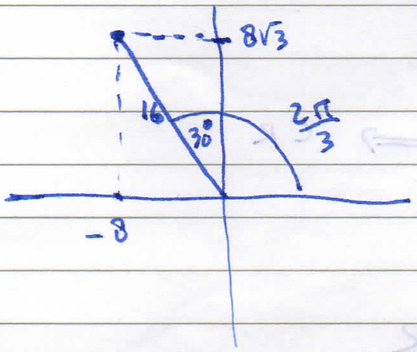
Dibuat oleh : Hartono	Dilarang memperbanyak sebagian atau seluruh isi dokumen tanpa izin tertulis dari FMIPA Universitas Negeri Yogyakarta	Diperiksa oleh :

NAMA	:	KUNCI
NO. MHS.	:	
PRODI/SEM	:	
MATA UJIAN	:	ANALISIS COMPLEX
HARI/TGL.	:	
TANDA TANGAN	:	

① Principal root of $(-8+8i\sqrt{3})^{1/4}$ is ...?

$$-8+8i\sqrt{3} = 16\, e^{\frac{2\pi}{3} i + 2\pi n} \quad , n = 0, \pm 1, \pm 2, \dots$$

(10)



$$(-8+8i\sqrt{3})^{1/4} = \left(16\, e^{\frac{2\pi}{3} i + 2\pi n}\right)^{1/4}$$

$$= 2\, e^{\left(\frac{\pi}{6} + \frac{n\pi}{2}\right) i} \quad , n = 0, \pm 1, \pm 2, \dots$$

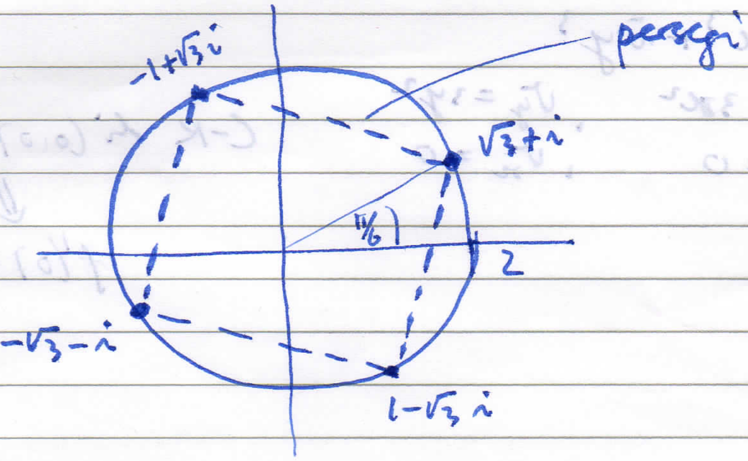
$n=0 \longrightarrow 2e^{\frac{\pi}{6} i} = 2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right) = 2\left(\frac{1}{2}\sqrt{3} + \frac{1}{2} i\right) = \sqrt{3} + i$

(10)

$n=1 \longrightarrow 2e^{\frac{2\pi}{3} i} = 2\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right) = 2\left(-\frac{1}{2} + \frac{1}{2}\sqrt{3}\, i\right) = -1 + \sqrt{3}\, i$

$n=2 \longrightarrow 2e^{\frac{7\pi}{6} i} = 2\left(\cos\frac{7\pi}{6} + i\sin\frac{7\pi}{6}\right) = 2\left(-\frac{1}{2}\sqrt{3} - \frac{1}{2} i\right) = -\sqrt{3} - i$

$n=3 \longrightarrow 2e^{\frac{10\pi}{6} i} = 2\left(\cos\frac{5\pi}{3} + i\sin\frac{5\pi}{3}\right) = 2\left(\frac{1}{2} - \frac{1}{2}\sqrt{3}\, i\right) = 1 - \sqrt{3}\, i$



(10)

(2) Menenuhi C-R tetapi tidak terdiferensialkan

(20)

a) $f(z) = \begin{cases} \frac{\bar{z}^2}{z} & , z \neq 0 \\ 0 & , z = 0 \end{cases}$

di $z = 0$.

~~b)~~ $f(z) = |z|^2$, $f'(0) \stackrel{=0}{\text{ada}} \Longrightarrow$ C R

~~c)~~ $f(z) = Re(z) = x$

$u_x = 1$, $v_y = 0$ tidak C-R

~~d)~~ $f(z) = x^3 + i(1-y)^3$

$u_x = 3x^2$, $v_y = -3(1-y)^2$. tidak C-R di $(0,0)$

$u_y = 0$, $v_x = \cancel{3x}\ 0$

~~d)~~ $f(z) = x^3 + iy^3$

$u_x = 3x^2$, $v_y = 3y^2$

$u_y = 0$, $v_x = 0$

C-R di $(0,0)$ & kontinu

$\Downarrow$

$f'(0)$ ada

(3) $\int_C \frac{z+1}{z}\, dz$, $\quad C : z = e^{i\theta}$, $0 \le \theta \le 2\pi$. (10)

$$\int_0^{2\pi} \frac{e^{i\theta}+1}{e^{i\theta}}\, d e^{i\theta} = i\int_0^{2\pi} \frac{e^{i\theta}+1}{e^{i\theta}} \cdot e^{i\theta}\, d\theta$$

$$= i\int_0^{2\pi} \left(e^{i\theta}+1\right) d\theta$$

$$= e^{i\theta} + i\theta \Big]_0^{2\pi} \qquad (20)$$

$$= \left(e^{2\pi i} + 2\pi i\right) - (1+0)$$

$$= \cos 2\pi + i \sin 2\pi + 2\pi i - 1$$

$$= 1 + 0 + 2\pi i - 1$$

$$= 2\pi i$$

hal 135 1. $\int_C \frac{z+2}{z}\,dz$ $C : z = 2e^{i\theta}$, $0 \le \theta \le 2\pi$

$$\int_0^{2\pi} \frac{2e^{i\theta}+2}{2e^{i\theta}}\, d(2e^{i\theta}) = \int_0^{2\pi} \frac{2e^{i\theta}+2}{2e^{i\theta}} \cdot 2ie^{i\theta}\, d\theta$$

$$= 2i\int_0^{2\pi} (e^{i\theta}+1)\, d\theta = \Big[2e^{i\theta} + 2i\theta\Big]_0^{2\pi}$$

$$= (2e^{i2\pi} + 4\pi i) - (2+0)$$

$$= 2 + 4\pi i - 2$$

$$= 4\pi i$$