# Second Exam-MATH 413-(Complex Analysis) 

## 23\6\1435H-2014-Semester II

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Name: $\qquad$ Co: $\qquad$

## Q1: True or False: (3 Marks)

1- If $z=x+i y$, then $\operatorname{Re}\left(e^{z}\right)=\cos y$.

2- $\operatorname{Im}(\log z)=\arg z$.

3- The sector $\frac{-\pi}{6}<\arg z<\frac{\pi}{6}$ is a simply connected domain. (try to sketch it)

4- For any $z \in C,-1 \leq \sin z \leq 1$.

5- If $w_{1}$ and $w_{2}$ are two values of $\log z$, then $\operatorname{Re}\left(w_{1}\right)=\operatorname{Re}\left(w_{2}\right)$.

6- If $z(t), a \leq t \leq b$, is a parameterization of a contour $C$ and $z(a)=z(b)$ then $C$ is a simple closed contour.

## Q2: Fill the blanks (3 Marks)

1- $\cos (4 i)=--------------$
2- $\operatorname{coth} z \quad$ is not defined for $Z=-----------$

3- If $f(z)$ is a polynomial function and C is a simple closed contour, then
$\int_{C} f(z) d z=------$

4- $z(t)=e^{i t^{2}}, 0 \leq t \leq \sqrt{2 \pi}$ is a parameterization for a ------ with radius -----and centered at the -----

Q3: Find the solutions of the equation
(1.5 Marks)

$$
e^{w}=-2
$$

Q4: Find
a) the Principle logarithm of $\log (6-6 i)$
b) the value of $i^{2 i}$
c) the derivative of $\tanh (i z-2)$

$$
\sin z=5
$$

Q6: Find the upper bound of

$$
\left|\int_{C} \frac{e^{z}}{z+1}\right|
$$

where C is the circle $|z|=4$.

Q7: Find the value of

$$
\int_{C} \frac{2 z+1}{z^{2}+z} d z
$$

where $C$ is the circle in positive direction with
(a) $|z|=\frac{1}{2}$,
(b) $|z+3 i|=1$

Q8: Evaluate

$$
\int_{C} \frac{1}{Z^{\frac{1}{2}}}
$$

where $C$ the line segment between $z=i$ and $z=9$.

Q9: Show that

$$
\overline{e^{z}}=e^{\bar{Z}}
$$

Good Luck ©

