中山大学软件学院 **2008** 级软件工程专业(2009 秋季学期)

《工程数学》期末试题(B 卷)

(考试形式： 闭卷 考试时间：2 小时)

警示

《中山大学授予学士学位工作细则》第六条

考试作弊不授予学士学位

方向：_____ 姓名：_____ 学号：_____

1. Find values of:

(a) $\mathrm{Ln}(-3)$; (b) $\mathbf{2^{(1+i)}}$. (10 points)

2. Function $v(x,y)=e^x(y\cos y+x\sin y)+x+y$, is harmonic, find an analytic function $f(z)=u+iv$ such that satisfying $f(0)=0$. (10 points)

3. Evaluate each of the following integrals: (20 points)

(a) $\oint_{|z|=2}\dfrac{e^z}{z(z-1)^2}\mathbf{d}z$;

(b) $\int_{|z|=2}\dfrac{z}{(9-z^2)(z+i)}\mathbf{d}z$;

(c) $\oint_{|z|=2}\dfrac{\mathbf{d}z}{(z+i)^{10}(z-1)(z-3)}$;

(d) $\oint_{|z-1|=3}\dfrac{1}{(z-2)^2z^3}\mathbf{d}z$.

4. Find the series representation for the function $\arctan z$ at $z=0$. (10 points)

5. Evaluate integral of $\oint_C\dfrac{\sin\frac{\pi}{4}z}{z^2-1}\mathbf{d}z$, where C: $|z+1|=\dfrac{1}{2}$. (10 points)

6. Find a representation for the function $e^{\frac{1}{1-z}}$ in powers of z. (10 points)

7. Find the residue of function $f(z)=\dfrac{z-\sin z}{z^6}$ at $z=0$. (10 points)

8. Find the inverse Laplace transform of function $F(s)=\dfrac{2s+5}{(s+2)^2+9}$. (10 points)

9. Evaluate integral $\int_C\dfrac{1}{e^z-i^i}dz$ along positively oriented circle $C:|z-2\pi|=2\pi$. (10 points)