**King Saud University Second Semester**

**College of Science 1432/1433**

**Mathematics Department(Girls section)**

**First Mid Term Exam 385**

**Question1**

**Prove or disprove each of the following statements:**

a)If f is continuous at $z\_{0}$ then Imf is also continuous at $z\_{0}$.

b) $Im(\frac{1}{z})$ is harmonic in any domain not containing the point z=0.

c) $Arg\frac{z\_{1}}{z\_{2}}=Argz\_{1}-Argz\_{2}.z\_{1}\ne 0,z\_{2}\ne 0.$

**Question2**

 ,$nϵN.$ a)Evaluate $(sin\frac{π}{n}+icos\frac{π}{n})^{n}$

b)Evaluate( $\frac{1-i}{\sqrt{3}+i})^{\frac{1}{20}}$

c)Find the domain of analyticity of $f\left(z\right)=\left|z\right|+z.$

**Question 3**

a)Show that if $f\left(z\right)=u+iv$ is differentiable at $z\_{0}$ then it satisfies The C-R equations there.

 **b**) Let $f\left(z\right)=\left\{\begin{matrix}\frac{xy(x+iy)}{x^{2}+y^{2}}&z\ne 0\\0&z=0\end{matrix}\right.$

Show that f satisfies C-R equations at z=0 but it is not differentiable at z=0.