THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

Subject Title : Engineering Mathematics **Subject Code** : CCN2250

Session : Semester One, 2017/18

Numerical Answers

Question A1

(a) $-16+16i\sqrt{3}$

(b) $z_0 = 2e^{\frac{1}{4}\pi i}$ $z_1 = 2e^{\frac{11}{12}\pi i}$ $z_2 = 2e^{-\frac{5}{12}\pi i}$

Question A2

(a)

(x, y)	$D = f_{xx}f_{yy} - f_{xy}^2 = -6(24x-24)-12^2$	$f_{xx} = 24x-24$	Nature
$(5, 2)$	$-6(24(5)-24)-12^2 = -720 < 0$		Saddle point
$(-5, -18)$	$-6(24(-5)-24)-12^2 = 720 > 0$	$-144 < 0$	Local maximum

(b) $D_{\mathbf{u}} f(1,2) = -76.8$

Question A5

(a) A basis for the row space is $\{(1 \quad 0 \quad 0 \quad 1), (0 \quad 1 \quad 0 \quad -1), (0 \quad 0 \quad 1 \quad 1)\}$.

A basis for the column space is $\left\{\begin{pmatrix}1\\5\\-4\\-4\end{pmatrix}, \begin{pmatrix}1\\1\\-1\\3\end{pmatrix}, \begin{pmatrix}2\\-2\\3\\7\end{pmatrix}\right\}$. A basis for the null space is $\left\{\begin{pmatrix}-1\\1\\-1\\1\end{pmatrix}\right\}$

Question B1

(b) 9.8925

Question B4

(c)

(x, y)	$f(x, y)$	Nature
$(4, 4)$	$=16$	maximum
$(-4, -4)$	$=16$	maximum
$(-4, 4)$	$=-16$	minimum
$(4, -4)$	$=-16$	minimum