(8pts) 1. Complete the indicated operation giving the result in both *"a+bi"* and *"$Re^{i\theta}$"* forms. Watch your units! and enter answer in the appropriate box.

Operation	*"a+bi"*	*"$Re^{i\theta}$"*
$(1+i)-(2+2i)$		
$(1+2i)+(1+3i)$		
$\left(e^{i\pi}\right)\left(e^{-i\pi}\right)$		
$\frac{4e^{i\pi}}{e^{-i(\pi/2)}}$		

(7 pts) 2.Find the determinant of the matrix below. Show work and Enter result in the space.

Determinant of $\begin{bmatrix} 1 & 3 & 0 & 0 \\ 1 & 2 & 0 & 0 \\ 1 & 2 & 2 & 2 \\ 0 & 3 & 0 & 3 \end{bmatrix} = \begin{bmatrix} \\ \\ \\ \\ \end{bmatrix}$

enter result above

_____/15

(7 pts) 3.Find the inverse of the matrix below. Show work and Enter result in the space provided.

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}^{-1} = \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$$

(8 pts) 4. Find the solution of the differential equation below using Laplace Transforms.

$$4\dot{x} + 12x = 2, \quad x(0) = 4$$

_____/15

Time function $e(t)$	Laplace transform $E(s)$
$u(t)$	$\frac{1}{s}$
t	$\frac{1}{s^2}$
$\frac{t^2}{2}$	$\frac{1}{s^3}$
t^{k-1}	$\frac{(k-1)!}{s^k}$
e^{-at}	$\frac{1}{s+a}$
te^{-at}	$\frac{1}{(s+a)^2}$
$t^{k-1}e^{-at}$	$\frac{(k-1)!}{(s+a)^k}$
$1-e^{-at}$	$\frac{a}{s(s+a)}$
$t-\frac{1-e^{-at}}{a}$	$\frac{a}{s^2(s+a)}$
$1-(1+at)e^{-at}$	$\frac{a^2}{s(s+a)^2}$
$e^{-at}-e^{-bt}$	$\frac{b-a}{(s+a)(s+b)}$
$\sin bt$	$\frac{b}{s^2+b^2}$
$\cos bt$	$\frac{s}{s^2+b^2}$
$t\sin bt$	$\frac{2bs}{(s^2+b^2)^2}$
$t\cos bt$	$\frac{s^2-b^2}{(s^2+b^2)^2}$
$e^{-at}\sin bt$	$\frac{b}{(s+a)^2+b^2}$
$e^{-at}\cos bt$	$\frac{s+a}{(s+a)^2+b^2}$
$1-e^{-at}\left(\cos bt+\frac{a}{b}\sin bt\right)$	$\frac{a^2+b^2}{s[(s+a)^2+b^2]}$
$A = 1-e^{-aT}\left[\cos bT+\left(\frac{a}{b}\right)\sin bT\right]$	
$B = e^{-2aT}+e^{-aT}\left[\left(\frac{a}{b}\right)\sin bT-\cos bT\right]$	

_____/15