Diffy Eqns MAP2302 — **U-Class** — Prof. JLF King, Wedn, 04Apr2018

Welcome. **Write expressions unambiguously e.g, "$1/a+b$" should be bracketed either $[1/a]+b$ or $1/[a+b]$. (Be careful with negative signs!)**

U1: Show no work.

a) A multivariate polynomial, where each monomial has the same degree, is circle

monogamous	**atrocious**	**gregarious**	
monic	**expialadocious**	**homogeneous**	
manic	**unitary**	**Unitarian**	**utilitarian**

b) Suppose $y(0)=2$, $y'(0)=3$, $y''(0)=5$. Then $\mathcal{L}\big(y^{(3)}+2y'\big)(s)$ equals $\big[[p(s)\cdot\widehat{y}(s)]+q(s)\big]$ for **polynomials**

$p(s)=$ ……

and $q(s)=$ …… .

c) Let $h()$ be this square-wave: $h(t):=5$ if (floor) $\lfloor t\rfloor$ is a multiple of 3, and $h(t):=0$ otherwise. Then $\widehat{h}(s)=$ …… .

d) Op $\mathsf{L}(y):=3t^2y''+7ty'-4y$ is equidim'nal. The gen.soln to $\mathsf{L}(y)=0$ is $y(t)=\alpha\cdot$ …… $+\beta\cdot$ …… .

e) Gamma fnc: $\boldsymbol{\Gamma}(5)=$ …… and $\boldsymbol{\Gamma}(\frac{5}{2})=$ ……

For all real $x>1$, our $\boldsymbol{\Gamma}()$ function satisfies recurrence relation

$\boldsymbol{\Gamma}(x)=$ …… .

f) Matrices $\mathsf{A},\mathsf{B},\mathsf{U}$ are 2×2, with U invertible. Then

$e^{\mathsf{A}+\mathsf{B}}=e^{\mathsf{A}}\cdot e^{\mathsf{B}}$: *AT* *AF* *Nei*

$\mathsf{U}e^{\mathsf{B}}\mathsf{U}^{-1}=e^{\mathsf{U}\mathsf{B}\mathsf{U}^{-1}}$: *AT* *AF* *Nei*

If e^{B} *invertible, then* B *is invertible*: *AT* *AF* *Nei*

U2: Show no work.

i) Inverse of $\mathsf{C}:=\begin{bmatrix}1&1\\2&1\end{bmatrix}$, is $\mathsf{C}^{-1}=$ …… .

Conjugating $\mathsf{W}:=\begin{bmatrix}9&-5\\10&-6\end{bmatrix}$ by C gives diagonal matrix $\mathsf{D}:=\mathsf{C}^{-1}\mathsf{W}\mathsf{C}=$ …… .

Thus the $(2,1)$-entry of $e^{t\mathsf{W}}$ is …… .

ii) Fncs $x(t)$ and $y(t)$ satisfy this system of DEs,

$$x' + x - 3y = 0\,,$$
$$y' + 6x - 8y = 0\,.$$

It can be written as $\mathsf{Y}'=\mathsf{M}\cdot\mathsf{Y}$, where $\mathsf{Y}:=\begin{bmatrix}x\\y\end{bmatrix}$ and M is matrix …… .

Characteristic poly of M is $\wp_{\mathsf{M}}(z)=$ ……

A soln has $x(t)$ a linear combination of $e^{\alpha t}$ and $e^{\beta t}$ for *numbers* $\alpha=$ …… and $\beta=$ …… .

End of U-Class

U1:	___ ___ ___	130pts
U2:	___ ___	55pts
Total:	___ ___ ___	185pts