Differential Eqns MAP2302 3151 **Z-class** Prof. JLF King 4Sep2015

Note. Do ***not*** approx.: If your result is "$\sin(\sqrt{\pi})$" then write that rather than .9797$\cdots$.Use "$f(x)$ notation" when writing fncs; in particular, for trig and log fncs. E.g, write "$\sin(x)$" rather than the horrible $\sin x$ or $[\sin x]$. Write expressions unambiguously e.g, "$1/a+b$" should be bracketed either $[1/a]+b$ or $1/[a+b]$. (Be careful with **negative** signs!)

Use ***cts*** for "continuous" and ***IVP*** for "initial value problem".

Z1: Show no work. z Professor King sometimes gives freebie questions. *Circle one:* **True** **Right On!** ***Who?***

ȧ Give the gen.soln to $dy/dt = 4y^2t^3$. [*Hint:* SoV.]
$y(t)=$ ⌞. . . . . .⌟

ḃ List the equilibrium points of DE

$$y' = [y^2 - 7y + 10] \cdot [y+3]^2.$$

and classify them by "R", "A", "UpN" (Up Node), and "DnN" (Down Node).
EP: ⌞. . . . . .⌟.
Suppose $y(4) = -1$. Then

$\lim_{t\to\infty} y(t) =$ ⌞. . . . . .⌟ and $\lim_{t\to-\infty} y(t) =$ ⌞. . . . . .⌟.

Suppose $y(-1) = 4$. Then

$\lim_{t\to\infty} y(t) =$ ⌞. . . . . .⌟ and $\lim_{t\to-\infty} y(t) =$ ⌞. . . . . .⌟.

c An example of an order-3 *linear* ODE is:

⌞. . . . . .⌟.

Essay questions

Please write (on your own paper) in complete grammatical sentences. *Also* fill in the blanks.

Z2: a Carefully state the Fund. Thm of ODEs.

b Produce an example of a particular IVP $\boxed{\frac{dy}{dx} = G(x,y) \text{ with } y(0)=0}$, where your
$G(x,y) :=$ ⌞. . . . . .⌟
is everywhere defined and **cts**, so that the IVP has *two* different solutions:
$y_1(x)=$ ⌞. . . . . .⌟ and
$y_2(x)=$ ⌞. . . . . .⌟.

Z3: Showing all the steps in the FOLDE algorithm, compute the general solution $y()$ to

$$\frac{dy}{dx} - \frac{y}{x} = x \cdot \sin(x)$$

Also write it here, as
$y_\alpha(x) =$ ⌞. . . . . .⌟.

End of Z-class

Z1:	___ ___ ___	120pts
Z2:	___ ___ ___	120pts
Z3:	___ ___	90pts
Total:	___ ___ ___	330pts

Print name ⌞. . . . . .⌟ Ord:

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor."*

Signature: ⌞. . . . . .⌟

Filename: `Classwork/DiffyQ/D2003g/z-cl.DfyQ2003g.latex`
As of: *Friday 04Sep2015*. Typeset: *4Sep2015* at *00:04*.