Staple!

Ord: ___ ___

Differential Eqns MAP2302 | **W-Class** | Prof. JLF King 30Sep2015

W1: Show no work.

z One of the authors of our text is (Circle):
Archimedes DNE Euler Fuchs Gauss Mendez Sanders Stirling Trump Tillman Williams Wright York Ziv

a Fnc $y_\beta(t) :=$ ⌞ . . . . . ⌟ is the general soln to $\frac{dy}{dt} = 8t^3 \cdot [y-5]$. [*Hint:* SoV.]
The *particular* $y()$ with $y(0) = 8$ is $y(t) :=$ ⌞ . . . . . ⌟. And this function has $y(1) =$ ⌞ . . . . . ⌟.

b *A* particular soln $y = y(t)$ to

†: $$\left[\mathbf{D} - 5\mathbf{I}\right]^3(y) \quad = \quad \mathsf{e}^{5t} + \mathsf{e}^{3t}$$

is $y(t) =$ ⌞ . . . . . ⌟.

c Function $h()$ satisfies $2h'' + h' - 6h \;=\; 0$, and initial conditions $h(0) = 5$ and $h'(0) = -3$. So

$$h(t) \quad = \quad \alpha \mathsf{e}^{At} + \beta \mathsf{e}^{Bt}, \text{ for numbers}$$

$\alpha =$ ⌞ . . . . . ⌟, $A =$ ⌞ . . . . . ⌟, $\beta =$ ⌞ . . . . . ⌟, $B =$ ⌞ . . . . . ⌟.

d For $t>0$, fnc $y_\alpha(t) :=$ ⌞ . . . . . ⌟ is the gen.soln to $y' + \left[\frac{2}{t} \cdot y\right] \;=\; t^3$. [*Hint:* FOLDE.]

W2: Show no work.

e DiffOperators $\mathbf{P}, \mathbf{Q}, \mathbf{R}, \mathbf{S}$ are defined as

$$\mathbf{P}(f) := f(3) \cdot f', \qquad \mathbf{Q}(f) := \cos(3) \cdot f^{(3)},$$
$$\mathbf{R}(f) := [\cos(3) \cdot f] + f'', \qquad \mathbf{S}(f) := \cos(3) + [3f'].$$

Then . . . $\mathbf{P}$ *is linear:* T F. $\mathbf{Q}$ *is linear:* T F.
$\mathbf{R}$ *is linear:* T F. $\mathbf{S}$ *is linear:* T F.

f The discriminant of polynomial $f(x) := 3x^2 + 3x + 1$ is $\text{Discr}(f) =$ ⌞ . . . . . ⌟.

g Let $f(t) := 3\mathsf{e}^{5t}$ and $g(t) := \mathsf{e}^{5t}$. Translating, then, $\mathbf{T}_\mathbf{r}(f) = g$, where $\mathbf{r} =$ ⌞ . . . . . ⌟ $\in \mathbb{R}$.

End of W-Class

W1: ___ ___ ___ 145pts

W2: ___ ___ 50pts

Total: ___ ___ ___ 195pts

Please PRINT your name and ordinal. Ta:

Ord: ⌞ . . . . . ⌟

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

Signature: ⌞ . . . . . ⌟

Hello. Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed. **Write expressions unambiguously e.g, "$1/a + b$" should be bracketed either $[1/a] + b$ or $1/[a+b]$. (Be careful with negative signs!)**

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 *rational numbers* as fractions: E.g $\frac{1}{2}$ and $1/3$, but not 0.51 nor 0.3333$\ldots$; **use fractions**.