

D1: Show no work.

a Prof. King believes that writing in complete, coherent sentences is crucial in communicating Mathematics, improves posture, and whitens teeth. Circle one:

True! Yes! *wH'at S a?sEnTENCe*

b For the RLC-circuit on the blackboard, denote the loop-currents at time t by $x(t)$ and $y(t)$ [in amps]. The system of DEs satisfied by $x()$ and $y()$ is

Loop 1: _____ = _____ and

Loop 2: _____ = _____ .

c With $f(x) := e^{7x}$ and $g(x) := e^{4x}$, then

$[f \otimes g](5) =$ _____ .

d Matrices A, B, U are 2×2 , with U is invertible. Then $e^{A+B} = e^A \cdot e^B$: *AT AF Nei*

$Ue^B U^{-1} = e^{UBU^{-1}}$: *AT AF Nei*

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

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

$$x' + x - 3y = 0,$$

$$y' + 6x - 8y = 0.$$

It can be written $Y' = M \cdot Y$,

where $Y := \begin{bmatrix} x \\ y \end{bmatrix}$ and M is matrix _____ .

Characteristic poly of M is $\wp_M(z) =$ _____ .

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

f Matrix $G := \begin{bmatrix} 2 & -1 & 3 \\ 4 & -2 & 4 \\ 0 & 0 & 0 \end{bmatrix}$

is nilpotent. Computing, $G^2 =$ _____ .

The $(1, 3)$ -entry of e^{Gt} is _____ .

g We can re-write function

$$f(t) := \cdot \cos\left(\frac{3}{4}\pi + 5t\right) + \sqrt{2} \cdot \cos\left(\frac{3}{2}\pi + 5t\right)$$

as $f(t) = R \cdot \cos(\theta + 5t)$, for real numbers

$R =$ _____ ≥ 0 and $\theta =$ _____ $\in [0, 2\pi)$.

End of D-Class

D1: _____ 165pts

Total: _____ 165pts

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:
