

MATH 309C - QUIZ 1
WINTER 2017

Name: _____ Student ID: _____

- You may use a scientific, **non-graphing** calculator during this quiz.
- Use the back of this sheet of paper if you run out of space.
- The duration of this quiz is 25 minutes.

1. (5 pts) Convert the following third order equation into a system of first order equations:

$$u''' + u'' - e^t u' + tu = 0.$$

2. (10 pts) Find the eigenvalues of matrices A and B , respectively:

$$A = \begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} \qquad B = \begin{pmatrix} \pi & 27 \\ 0 & e \end{pmatrix}.$$

3. (10 pts) Consider the linear 2×2 system of differential equations $x' = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix} x$.

(a) Verify that $x^{(1)} = \begin{pmatrix} e^{3t} \\ e^{3t} \end{pmatrix}$ and $x^{(2)} = \begin{pmatrix} e^{-t} \\ -e^{-t} \end{pmatrix}$ are solutions of the system.

(b) Compute the Wronskian $W[x^{(1)}, x^{(2)}]$.