Assessment Quiz #2

MATH 316 — Linear Algebra II
Friday, March 15

Please print your name:

Problem 1. (4 points) Solve the initial value problem $\boldsymbol{y}' = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix} \boldsymbol{y}, \quad \boldsymbol{y}(0) = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$ on the extra sheet.

The solution is $\boldsymbol{y}(t) =$ ☐ .

Make sure to check your answer by plugging into the differential equation! There will be no partial credit and you have plenty of time.

Problem 2. (1+3+1 points) Consider the sequence a_n defined by $a_{n+2} = 2a_{n+1} + 3a_n$ and $a_0 = 1$, $a_1 = 7$.

(a) The next two terms are $a_2 =$ ☐ and $a_3 =$ ☐ .

(b) A Binet-like formula for a_n is $a_n =$ ☐ .

(c) $\lim_{n \to \infty} \frac{a_{n+1}}{a_n} =$ ☐ .

Again, work on the extra sheet and be sure to check your answer to (b) by comparing with the values in (a).

Problem 3. (1+1+2+2 points) Fill in the blanks.

(a) If $A = \begin{bmatrix} 3 & 0 \\ 0 & -1 \end{bmatrix}$, then $e^{At} =$ ☐ .

(b) An example of a 2×2 matrix that is not diagonalizable is ☐ .

(c) If A has eigenvalue 3, then A^2 has eigenvalue ☐ , $4A$ eigenvalue ☐ , and A^T eigenvalue ☐ .

(d) How many different Jordan normal forms are there in the following cases?

- A 5×5 matrix with eigenvalues $1, 1, 2, 2, 2$? ☐
- A 9×9 matrix with eigenvalues $1, 1, 2, 2, 2, 4, 4, 4, 4$? ☐

Armin Straub
straub@southalabama.edu