

## Math 244 Quiz 3

Names: \_\_\_\_\_

1. Let  $A = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$ . What is the bottom right entry of  $A^{100}$ ?

2. Diagonalize  $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$  where  $a, b$  are any numbers.

**3.** Let  $B(t)$  be the number of bugs living in the local dining establishment at time  $t$  (in years). Assume that  $B(t)$  satisfies the differential equation  $B'(t) = kB(t) \cos(\frac{\pi}{2}t)$ . Initially, there are 50 bugs. After one year, there are 100. How many are there after 3 years?

**4.** Show that the solutions to a linear  $n^{th}$  order homogeneous differential equation form a subspace.

**5.** Solve  $xy'' + y' = x$ .