

## Math 302 Vocabulary

### Section 3.1

1. What do we mean by a **linear system with constant coefficients**?
2. Express the linear system that you found in part (1) in matrix form?
3. What is the **coefficient matrix** for a linear system?
4. What point is an equilibrium solution for *every* linear system?
5. When does a linear system have a nontrivial equilibrium point? In this case, how many equilibrium points does the system have?
6. State the **Linearity Principle**.
7. What does it mean to say a vector (or a solution) is a **linear combination** of other vectors (solutions)?
8. What does it mean to say that two vectors are **linearly independent**?

### Section 3.2

1. Define **eigenvalue** and **eigenvector** for a matrix **A**.
2. What is the **identity matrix**?
3. What is the **characteristic polynomial/equation** for a linear system?
4. What are the possible numbers of solutions that a quadratic equation may have?

### Section 3.3

1. What are the three types of equilibrium points for a linear system with real eigenvalues, and how do we determine which type the origin is?

### Section 3.4

1. What are complex numbers?
2. What does Euler's formula assert about complex numbers?
3. What are the three types of equilibrium points for a linear system with complex eigenvalues, and how do we determine which type the origin is?

### Section 3.5

1. What do we mean by a **repeated eigenvalue**?
2. If  $\lambda$  is an eigenvalue with eigenvector  $\mathbf{v}$  for a coefficient matrix **A** of a linear system, then what must be a solution to the linear system?
3. How many equilibrium points does a linear system have if zero is an eigenvalue for **A**?

### Section 3.6

1. Give an example of a linear, homogeneous second-order differential equation.
2. What is the characteristic polynomial for your example in part (1)?