Quiz

1. Put the following ODE in its standard form (i.e. $u' = f(u, t)$)

$$w'' = -w' + w(1 - w), w(0) = 1, w'(0) = 0$$

2. Write down the forward Euler time-stepping scheme for the following ODE

$$u' = sin(u + t)$$

3. In the context of numerical analysis, consistency + stability implies what?
4. Derive the Local Truncation Error (LTE) for the forward Euler time-stepping scheme

5. Put the following ODE in its standard form (i.e. $u' = f(u, t)$)

$$w''' + w = 0, w(0) = 1, w'(0) = 0, w''(0) = 2$$

6. Write down the backwards Euler time-stepping scheme for the following ODE: $u' = sin(t)$
7. What is the solution to the ODE $u' = \lambda u$? What happens to u at large t for (a) $Re(\lambda) < 0$, and (b) $Re(\lambda) > 0$?
8. What is an A-stable method? What does the A stand for? Which of the following is an A-stable method?
   - Forward Euler
   - Backwards Euler
   - The Fourth-Order Runge-Kutta
9. Which of the following methods would you prefer for a stiff ODE?
   - Forward Euler
   - Backwards Euler
   - The Fourth-Order Runge-Kutta