Topics for Exam 1

1. **Discrete Models of Population Growth: Difference Equations**

   1.1 Modeling bacterial growth: A conservation principle

   1.2 Malthusian or geometric growth (or decay) models

   1.3 Logistic growth

   1.4 General discrete models

      1.4.1 Linear models

      1.4.2 Non–linear models

      1.4.3 Systems of difference equations

   1.5 Analysis of discrete models

      1.5.1 Equilibrium points and stability

      1.5.2 The Principle of Linearized Stability

2. **Continuous Models of Population Growth: Differential Equations**

   2.1 First order differential equations

      2.1.1 The continuous Malthusian model: Exponential growth or decay

      2.1.2 Solving first order differential equations: separation of variables

   2.2 Qualitative analysis of first order differential equations

      2.2.1 The (continuous) logistic equation

      2.2.2 Equilibrium solutions

      2.2.3 Stable and unstable equilibrium points

      2.2.4 Asymptotic stability