

# Eigenvalues and Eigenfunctions

Math 330

Consider the ODE:

$$\frac{d^2v}{dx^2} = \lambda v$$

1. What is the solution to the ODE...

(a) ... if  $\lambda > 0$ ?

(b) ... if  $\lambda = 0$ ?

(c) ... if  $\lambda < 0$ ?

2. Which of the solutions you found in #1 satisfy the boundary conditions  $v'(0) = 0$  and  $v'(\pi) = 0$ ?

3. Which of the solutions you found in #1 satisfy the periodic boundary conditions  $v(-\pi) = v(\pi)$  and  $v'(-\pi) = v'(\pi)$ ?