

Strings course
homework #1
due Mon. Sept. 17

1. **Closed strings**

Consider a string forming a closed loop.

- (i) What are the boundary conditions on $y(t, x)$?
- (ii) What is the general solution to the equations of motion given the ansatz $y(t, x) = y(x) \sin(\omega t + \phi)$?
- (iii) Is the momentum $P_y = \oint dx \frac{\partial \mathcal{L}}{\partial(\partial y / \partial t)}$ conserved?

2. **Zwiebach 4.3**

3. **Zwiebach 4.6**