

Strings course  
homework #3  
due Mon. Oct. 1

1. **Quick calculation 6.3**

2. **Quick calculation 6.4**

3. **Area functionals**

- (i) Evaluate the area functional for an  $S^2 \subset \mathbb{R}^3$ .
- (ii) Write out the area functional for a plane  $\mathbb{R}^2 \subset \mathbb{R}^3$  characterized by a normal vector  $\mathbf{n}$  and passing through the point  $\mathbf{x}_0 \in \mathbb{R}^3$ .
- (iii) Consider a closed string forming a circular loop in the  $xy$  plane and moving in the  $z$  direction with speed  $v$ . What is the action? (You don't need to evaluate any integrals.)