

# Black Holes and Quantum Info, Fall 2021

## Problem Set 3

*Due: in lecture Thursday, Oct 14*

**Reading.** Do the reading for each lecture posted on the website.

### Problems

1. Exercise “RN free energy” in QGBH section 6.
2. Check that your answer to question 1 is consistent with the standard thermodynamic formulas to find  $\langle E \rangle$ ,  $\langle Q \rangle$ , and entropy  $S$  from the free energy.
3. Exercise “RN specific heat” in QGBH section 6.
4. Exercise “Schwarzschild action”, QGBH section 6
5. Exercise “Euclidean methods for the BTZ black hole,” QGBH section 6