Math 335: Differential Geometry
Midterm Preparation: Overview Questions

These questions are designed to help you solidify your high-level understanding of the material from our course so far. This list is not necessarily exhaustive, but should hopefully get you thinking about the bigger picture.

- What is the benefit of the Serret-Frenet apparatus? What does it help us do?

- Why is regularity of a curve important? How is it related to the regularity of a surface?

- Why is each of the components of the definition of a coordinate chart important? What is the consequence of each?

- How is the tangent plane defined? What is the significance of the following equation: $T_{\bar{p}}S = dx_{\bar{q}}(\mathbb{R}^2)$?

- What is the significance of the first fundamental form?

- Why is the change of parameters theorem important?

- What is the definition of differentiability of a function $f : S_1 \to S_2$? Why do we define it this way?

- What is the Gauss map? Why do you think we will care about it so much?

- Explain the ways in which $df_{\bar{p}}(w)$ is like a directional derivative.