Math 341 Quiz topics for Week 3

- Suppose $f\colon \mathbb{R}^2 \to \mathbb{R}^3$ is a parametrized surface. Give a parametrization of the tangent space for this surface at the point $f(p) \in \mathbb{R}^3$.
- What is a *topology* on a set X?
- Let X be a topological space.
  (a) What is a *neighborhood of a point* $x \in X$?
  (b) Let $A \subseteq X$. What does it mean to say A is *open*? What does it mean to say A is closed? What is the *closure* of A?
  (c) Given a basis for a topology, how do you form a topology?
- Let X and Y be topological spaces. What does it mean for a function $f\colon X \to Y$ to be *continuous*? What does it mean for X and Y to be *homeomorphic*?
- Let X be a topological space, and let $A \subseteq X$. What is the *subspace topology* on A?
- Let X and Y be topological spaces. What is the *product topology* on $X \times Y$?
- Let X be a topological space, let Z be a set, and let $f\colon X \to Z$ be a surjection. What is the *quotient topology* on Z?
- Let X be a topological space. What does it mean for X to be *Hausdorff*? What does it mean for X to be *connected*?
- Manifolds.
  - Let X be a topological space. What is an *n-dimensional chart* on X?
  - What does it mean to say X is *locally Euclidean*?
  - Given charts (U, h) and (V, k), what is the *transition function* from U to V? Make sure to specify the domain and codomain. What does it mean for these charts to be *differentiably related*?
  - What is an *n-dimensional atlas* on X? What does it mean for an atlas to be *differentiable*?
  - What is a *differentiable structure* on X.
  - What is an *n-dimensional differentiable manifold*?
  - What does it mean for a continuous function $f\colon M \to N$ to be *differentiable at* $p \in M$?
- Projective space.
  - What is projective n-space, $\mathbb{P}^n$?
  - What are the standard charts on $\mathbb{P}^n$.