Idea List: Chapters 13-14

Given to you:

Computational formulas for curvature and a_T, a_N,

Vector Functions

- **Definitions:** $\vec{r}(t)$ is continuous at $t = a$, $\vec{r}\,'(t)$ at $t = a$, $\vec{r}(t)$ is smooth, $\int \vec{r}(t)\,dt$, curvature κ, "TNB" frame
- **Notation:** Arc length function $s(t)$ and its derivative, ds/dt.
- **Computations/Theorems:** Rules of differentiation for dot and cross, arc length, parameterize with respect to arc length, $\vec{T}, \vec{N}, \vec{B}$, compute an osculating plane or circle, normal plane, velocity, acceleration.

Multivariate Functions

- **Definitions:** Level curve, level surface, F is continuous at (a, b), def of f_x, f_y, $D_u f$, ∇F, critical point, saddle point
- **Computations/Theorems:** Tangent plane (explicit and implicit) and normal line, linearization, differentials, chain rule, implicit diff, Clairaut's Theorem, Second Derivatives Test, Extreme Value Theorem, test critical points,
- **Other skills or ideas:** Find the domain, Show the limit DNE, use the Squeeze Theorem, Show not continuous, relationship between directional derivative and gradient, higher partial derivatives (and notation), Method of Lagrange Multipliers.
- Be sure you understand the differences (and relationships) between:
  - "F is differentiable at (a, b)" (Not the definition, use the theorem)
  - "F is continuous at (a, b)"
  - "F_x, F_y exist at (a, b)"
- Be able to discuss the **limit** in words. In particular, the difference between Calc I and Calc III limits.