Midterm 2: Review Session Outline.

Here's a listing of topics covered by the midterm.

Chapter 13

13.1) Definition of vector-valued function and smooth curve

→ Parametrizing a given curve (e.g., intersection of two surfaces) by a vector-valued function

13.2) Derivatives 3: integrals of vector-valued functions

→ Properties of derivatives with respect to vector operations.

→ Case where \(|\mathbf{r}'(t)|\) is constant.

13.3) Arc length:

→ Function \(s(t) = \int_a^t |\mathbf{r}'(t)| \, dt\)

→ Parametrization with respect to arc length
3.4) Projectile motion

- Tangential, Normal components of acceleration (NO KEPLER LAWS)

Chapter 14

14.1) Graphs of functions \( f(x, y) \).
- Domain, range of multivariate functions
- Level curves and level surfaces
- Contour maps

14.2) Multivariable limits
- Continuity
- Strategies to show a limit exists
  - Simplification/Continuity (See HW #14)
  - Squeeze theorem (See Example 4 and HW #22)
- Strategies to show a limit does not exist
  - Try all lines (See Example 3)
  - Try paths that homogenize (See HW #18)
14.3) \( \rightarrow \) Definition of partial derivatives

\( \rightarrow \) Interpretation as tangent lines to graph \( z = f(x, y) \) in \( x \)- and \( y \)- directions

\( \rightarrow \) Higher partial derivatives and Clairaut's theorem

\( \rightarrow \) Partial differential equations

(No Cobb-Douglas Production Function)

14.4) \( \rightarrow \) Definition of tangent plane \( \rightarrow \) how to compute it

\( \rightarrow \) Definition of linearization and how to compute it

\( \rightarrow \) Definition of differentiability (No need to memorize, just understand the concept: a function is differentiable \( \iff \) it has a good linear approximation near \( (a, b) \)).

\( \rightarrow \) Estimate error using differentials

14.5) \( \rightarrow \) Learn how to state and use the chain rule. Practice by doing the starred HW problems.

\( \rightarrow \) Memorize/understand the computation of (partial) derivatives of implicitly-defined functions.