Things you should know from 12.1, 2, 3:

12.1

- How do you determine the domain of a function $f(t)$? A vector-valued function $\mathbf{F}(t)$?
- How do you sketch an arbitrary curve in 3-space? Some hints:
  - Determine where the curve *begins* and *ends*.
  - Determine what the function looks like in the xy-, xz-, and yz-planes.
  - Know the parametric forms of some basic curves: circle, spiral, expanding / contracting spiral, line.
  - Practice! (And check your answer using MATLAB.)
- How do you determine where a curve intersects a surface?

12.2

- How do you compute the limit of a vector valued-function, namely $\lim_{t \to t_0} \mathbf{F}(t)$? Or, what do I mean by 'pass the limit inside the vector-valued function'?
- Some basic limit tricks:
  - Plug-in (when you can).
  - L'Hopital's rule.
  - Factoring numerators and denominators of rational functions.
  - Algebra. (Think of the $\lim_{t \to 0} e^{-1/t^2}$ example.)
- When does a limit exist[1]? Must $\lim_{t \to t_0} \mathbf{F}(t) = \mathbf{F}(t_0)$?
- Basic limit results from Theorem 12.5[2].

12.3

- Basic derivative results: power rule, product rule, quotient rule, chain rule.
- Derivatives of the basic trigonometric functions, exponentials, logarithms.
- Basic antiderivative (integration) results: u-substitution, integration by parts, the Fundamental Theorem of Calculus.
- How do you compute the derivative of a vector-valued function, $\frac{d}{dt}\mathbf{F}(t)$?

[1] At least intuitively. Don't worry about ϵ/δ-style arguments for this quiz.
[2] Though most of these are results you would have guessed without a theorem.

- How do you compute the antiderivative (integral) of a vector-valued function, $\int \mathbf{F}(t)\,dt$?
- Basic derivative results from Theorem 12.10.
- Given a position vector $\mathbf{r}(t)$ for some particle in space, how do we compute its velocity $\mathbf{v}(t)$? Speed $||\mathbf{v}(t)||$? Acceleration $\mathbf{a}(t)$?
- Given the acceleration vector $\mathbf{a}(t)$ for a particle in space and its initial position and velocity, how do we compute its velocity $\mathbf{v}(t)$? Position $\mathbf{r}(t)$?