13.1 Videos Guide

13.1a

- Forms of vector functions
  - $\mathbf{r}(t) = \langle f(t), g(t), h(t) \rangle = f(t)\mathbf{i} + g(t)\mathbf{j} + h(t)\mathbf{k}$
  - Parametric equations: $x = f(t), \quad y = g(t), \quad z = h(t)$
- Limit of a vector function
  - $\lim_{x \to a} \mathbf{r}(t) = \langle \lim_{x \to a} f(t), \lim_{x \to a} g(t), \lim_{x \to a} h(t) \rangle$

Exercises:

- Find the domain of the vector function $\mathbf{r}(t) = \cos t\ \mathbf{i} + \ln t\ \mathbf{j} + \dfrac{1}{t-2}\ \mathbf{k}$.
- Find the limit $\lim_{t \to 1} \left(\dfrac{t^2-t}{t-1}\ \mathbf{i} + \sqrt{t+8}\ \mathbf{j} + \dfrac{\sin \pi t}{\ln t}\ \mathbf{k} \right)$.

13.1b

- Sketch the curve with the given vector equation. Indicate with an arrow the direction in which t increases.
  - $\mathbf{r}(t) = 2 \cos t\ \mathbf{i} + 2 \sin t\ \mathbf{j} + \mathbf{k}$
  - $\mathbf{r}(t) = \langle \sin \pi t, t, \cos \pi t \rangle$

13.1c

- Find a vector function that represents the curve of intersection of the cylinder $x^2 + y^2 = 4$ and the surface $z = xy$.

- Using graphing utilities