Section 14.1 – Vector -Valued Functions

- Vector-Valued Functions: $r(t) = \langle x(t), y(t), z(t) \rangle$
- The domain is the largest set of values of t on which all x, y, and z are defined. When x, y, and z are linear functions the resulting curve is a line.
- Orientation: The positive or forward direction is the direction in which the curve is generated as the parameter increases from a to b.
- Graph the curve described by the following functions.
  - $r(t) = \cos t\, i + \sin t\, k$ for $0 \le t \le 2\pi$

- $r(t) = \cos t\, i + j + \sin t\, k$ for $0 \le t \le 2\pi$

- Limits of Vector-valued functions: $\lim\limits_{t \to a} \boldsymbol{r}(t) = \langle \lim\limits_{t \to a} x(t), \lim\limits_{t \to a} y(t), \lim\limits_{t \to a} z(t) \rangle = \langle L_1, L_2, L_3 \rangle.$

- Evaluate the following limits:

  - $\lim\limits_{t \to \infty} \left(e^{-t} \boldsymbol{i} - \frac{2t}{t+1} \boldsymbol{j} + \tan^{-1} t \, \boldsymbol{k} \right)$