MATH 104: WORKSHEET 5

1. Concepts

- Distance formulas:
  (1) In $\mathbb{R}^2$, the distance between an point $P(x_1, y_1)$ and a line $ax + by + c = 0$ is
  $$D = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}\,.$$
  (2) In $\mathbb{R}^3$, the distance between an point $P(x_1, y_1, z_1)$ and a plane $ax + by + cz + d = 0$ is
  $$D = \frac{|ax_1 + by_1 + cz_1 + d|}{\sqrt{a^2 + b^2 + c^2}}\,.$$
  Remember, the dimension is very important! You can't have the first formula in $\mathbb{R}^3$ because $ax + by + c = 0$ is NOT an equation for a line in $\mathbb{R}^3$.
- Equations for Conic sections, Cylinders and Quadric Surfaces: read notes and books
- Vector functions
  $$\vec{r}(t) = \langle f(t), g(t), h(t)\rangle = f(t)\vec{i} + g(t)\vec{j} + h(t)\vec{k}\,.$$

2. Questions

Question 1. Sketch the following functions:

(1)
$$\vec{r}(t) = \langle 1 + 2t, 2 + t, t\rangle$$

(2)
$$\vec{r}(t) = \langle t, \sin t, \cos t\rangle$$

(3)
$$\vec{r}(t) = \langle t, t, t^2\rangle$$

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