Possible timeline for fifth lecture

Title: Functions of two and three variables

- 1. Functions of two variables (10 minutes)

  - Definitions like domain range
  - Matching of functions

- 2. Functions of three variables, level surfaces

  - Planes $ax + by + cz = d$ from last lecture
  - $x^2 + y^2 + z^2 = 1$ from first week
  - $z - f(x, y) = 0$, graphs from previous section

- 3. Quadrics: Ellipsoids, spheres especially

- 4. Quadrics: Paraboloids, elliptic and hyperbolic

- 5. Quadrics: Hyperboloids, one and two sheeted

- 6. Quadrics: Singular cases

  - cone: transition from
  - cylinder
  - $x^2 = y^2$, $z = x^2$ etc