TMATH 342: WrittenHW 3

Read Giusti's "Thinking Topologically" pages 21-22 and then do:

1. [3] Build a space X with a topology τ_X so that $|\pi_0(X)| = 3$.
2. Consider the saddle surface X in $\mathbb{R}^3$ given by

$$X = \{(x, y, z) | z = x^2 - y^2, x, y \in [-1, 1]\}.$$

Let $f : X \to \mathbb{R}$ given by $f(x, y, z) = z$.

   (a) [3] Nicely draw or use a computer to plot the surface of X. Be sure that the x, y, and z axis are easy to identify!
   (b) [3] Identify the set $f^{-1}(1) \subset X$ on your drawing above.
   (c) [1] Find $|\pi_0(f^{-1}(1))|$.
   (d) [2] Identify the set $f^{-1}(.5) \subset X$ on your drawing above.
   (e) [1] Find $|\pi_0(f^{-1}(.5))|$.
   (f) [2] Identify the set $f^{-1}(0) \subset X$ on your drawing above.
   (g) [1] Find $|\pi_0(f^{-1}(0))|$.
   (h) [4] Draw the Reeb graph of f.

Note, in this class, it is more important to communicate clearly, than it is to be correct! Make sure that you edit your work (and your peers!!) so that your completed homework is easily understood!