On Friday Day 08, I modified this assignment to be shorter. Namely, part b of problem A is no longer required, and parts bcd of problem D are no longer required.

A. Section 20 Exercise 3a (about the metric's being a continuous function).

(Hint: I solved this problem by considering the special case $X = \mathbb{R}$ and $U = (a, b)$, drawing a picture, and using that picture to invent a proof that $d^{-1}(U)$ was open. After that, the general solution required only minor improvements to the special-case solution.)

B. Section 21 Exercise 2 (about embeddings, which are defined on page 105).

We didn't get to "limit points" in class today, but all you need to do the following exercise is the definition: If $Y \subseteq X_T$, then $x \in X$ is a *limit point* of Y if every neighborhood of x intersects Y in at least one point other than x. In other words, $x \in \overline{Y - \{x\}}$.

C. In $\mathbb{R}^2$, let Y be the graph of $y = \sin(1/x)$ for $x > 0$. What are (A) the interior, (B) the closure, (C) the boundary, and (D) the set of limit points of Y? You do not need to rigorously prove your answers, but do be careful.

D. Section 17 Exercise 19a (about boundaries).

Here's a bonus question, which you are not required to hand in: In a metric space (X, d), recall that $B(x, \epsilon) = \{y : d(x, y) < \epsilon\}$. Is it true that $\overline{B(x, \epsilon)} = \{y : d(x, y) \leq \epsilon\}$? Prove so or give a counter-example.

Want more optional practice? Try Section 17 Exercises 2, 7, 8, 9, 20, and 19bcd. Also, study what Munkres has to say about closed subsets of a subspace Y of a space X_T.