MATH 461: Mid-term Extra

Let $X = \mathbb{R}$ and $\mathcal{T} = \{O \subset X | X - O \text{ is countable}\}$ (and recall that for us, countable includes finite).

(1) Show that $\mathcal{T}$ is a topology on X.
(2) What is $cl([-3, 2])$?
(3) Is $(X, \mathcal{T})$ separable?
(4) Is it T_0, T_1, or T_2?
(5) Is it metrizable?
(6) Does $a_n = \frac{1}{n}$ converge? If so, to what point or points?

For those of you who want more of a challenge: is this topological space 1^{st} countable? 2^{nd} countable? (these are just for fun!).

You must turn this in by 4:00 pm Wednesday, October 24, if you wish to receive extra credit.