MA30041: Metric Spaces

Self-Assessment Sheet 10: Connectedness

1.) Show that, even when it is not empty, the intersection of connected sets need not be connected.
For a solution, click on the the following space:

2.) Is the union of two connected sets connected?
For a solution, click on the the following space:

3.) Suppose Y is a connected subset of a metric space (X, d). Show: If $Z \subset Y'$, then $Z \cup Y$ is connected.
For a solution, click on the the following space:

4.) Let Y be a subset of a metric space (X, d).

(i) Give an example in which Y is conneted but $\operatorname{int} Y$ is not connected.
For a solution, click on the the following space:

(ii) Can you find such an example in $\mathbb{R}$ with the standard metric? If not, why not.
For a solution, click on the the following space:

5.) Suppose Y is a connected subset of a metric space (X, d). Must the boundary ∂Y be connected?
For a solution, click on the the following space:
