Explore the color magnitude diagram (CMD) of the open cluster M67 using SDSS, 2MASS, and WISE data using photometry collected from the respective online databases.

Construct color magnitude diagrams for g vs. r-i (SDSS), J vs. J-Ks (2MASS), and W1 vs. W1-W2 (WISE). The database query tools at the various project sites will permit you to select sources within a proscribed radius of a target coordinate. Your first job is to come up with an appropriate radius that well samples the cluster without incorporating too many contaminating field stars.

Within the proscribed radius you will have a variety options to select stars with different photometric characteristics. For example you can select on a minimum signal to noise level or a maximum uncertainty in each color; 2MASS and WISE have photometric quality flags (ph_qual) that relate to SNR as well. Think of ways to reduce contamination from sources of dubious quality (for example, CMD’s require three reliable measurements in different filters. Only one of those measurements has to be “bad” to yield a bad data point). Find a quality constraint that matters and show how the CMD changes with and without that constraint (do so for either SDSS or 2MASS).

For SDSS construct a CMD using stars from a similarly sized area but offset from the cluster in order to determine the portions of the cluster CMD that are contaminated by features of the field star population.

Speculate on the differences between the SDSS, 2MASS, and WISE CMDs.