

Tutorial Exercises: Week 1

Problem 1.

Imagine that you are at the 2.3m telescope at Siding Spring. It is 1st August, and you are hoping to observe a number of bright galaxies from a catalogue. You will need three hours per galaxy to carry out your observations. You have three nights of time – the weather forecast looks good for the first two nights, but is a bit iffy for the third (not that you can trust forecasts that far out).

Work out an observing strategy. Which objects will you try to do first? Then what? What will you need to take into consideration as the night goes on, when picking the next target?

Ideally you would observe the whole sample. But that may not be possible if the weather deteriorates – in this case you'd ideally like to start with the brighter ones, and have a sub-sample complete down to some limiting magnitude.

Note: sidereal time at midnight on 1st August is 19:59 hours. Siding Spring is located at 31 degrees South. It becomes dark enough to observe your targets at 5.45pm, and too bright at 6.15am.

Here is the catalogue of galaxies:

Name	RA	Dec	I-band Magnitude
NGC1234	15:03:07.23	+03:02:27.6	16.7
AOG-2	15:12:22.73	-55:23:45.5	17.5
NGC6666	15:32:55.78	-09:27:35.6	17.9
M203	16:44:34.52	-23:27:00.3	18.5
M666	17:01:00.34	-74:56:55.7	18.3
ESO-5	17:34:22.23	-32:30:30.0	19.3
Malin-7	18:03:03.42	+11:07:34.2	16.9
Crucis-1	18:22:25.43	-63:45:03.2	19.2
Erwin's folly	20:23:09.45	-03:23:45.6	18.2
The Whirlwind	21:36:45.67	-18:23:45.7	19.0
UGC2468	22:38:03.45	-44:34:23.9	17.3
Carina-203	01:04:03.23	-32:27:44.3	18.9

Problem 2:

You have measured the B-band and K-band magnitudes of a star. You used the normal Vega magnitude scale. You now want to compare your B-K colour against the published colours of another, supposedly similar star you found in the literature.

Your colour: B-K = 3.43

Literature colour: B-K = 3.41

Unfortunately, when you read the small-print in the literature paper, you found that the published colour used AB-magnitudes, not Vega magnitudes.

Convert the literature value into a Vega magnitude value, and compare it to your measurement.

Problem 3:

You are trying to work out whether you can observe your favourite star cluster in the near-IR with Gemini. On the Gemini web page, you find that it can observe sources like this in the H-band (1.6 microns) that are as faint as 0.03 mJy (milli-Janskies).

Unfortunately, you do not know the brightness of your cluster in mJy – all you know is its H-band magnitude, which is 22.31.

Can you observe this target with Gemini?