Exercise section 8

McLean seminar
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Question 1

1 Why must CCDs be cooled to low temperatures for astronomical use?

To reduce thermal noise, the CCD must be cooled
- The thermal noise arises from the random motion of electrons within the sensor due to heat.
- This noise (= dark current) accumulates as a background signal in the image and can obscure faint celestial objects.

Cooling CCD
- allows astronomers to detect fainter objects in space with greater accuracy and increases the overall sensitivity of the CCD
- prevent 'hot pixels' from affecting the quality of the images

Question 7

7 A CCD camera seems to be showing a faint—but regular—pattern of sloping lines on bias frames (i.e., very short exposures with the shutter closed). What could be wrong?

➔ If the camera's electronics are not properly grounded or shielded, stray electrical noise can be picked up and manifest as regular patterns.

To solve this problem, grounding can help reduce this issue.