

Correction instructions for AST2210 exam, autumn 2018:

Each main exercise counts for 25% of the total score, and each sub-exercise within each main exercise counts the same fractional score towards that score.

Exercise 1: (max 25 points)

- Each identified correct answer gives **1 point**
- Each omitted incorrect answer gives **1 point**
- Each identified incorrect answer deducts **1 point**
- Each omitted correct answer deducts **1 point**

- The maximum total score is 36
- The minimum total score is 0
- Problem j does not count toward the score
- The final total score for the main exercise is $25 * (\text{achieved score}/36)$

Exercise 2: (max 25 points)

- Each sub-problem can yield a total of 10 points, for a total of 70 points
- The final score for the main exercise is $25 * (\text{achieved score} / 70)$

- Exercise 2a:
 - Sketch of Cassegrain telescope – 3 points
 - Sketch of Gregorian telescope – 3 points
 - Gregorian: better straylight control, upright image – 2 points
 - Cassegrain: longer focal length – 2 points
- Exercise 2b:
 - Correct ray-tracing figure – 5 points
 - Explain spherical aberration – 5 points
- Exercise 2c:
 - Physical explanation of Airy disc – 5 points
 - Connection with angular resolution – 5 points
- Exercise 2d:
 - General expression for diffraction limit – 5 points
 - Correct numerical value – 5 points
- Exercise 2e:
 - Connection with polarization – 2 points
 - Description of each parameter – 2 points each
 - Sign on Q, U and V doesn't matter
- Exercise 2f:
 - Multiplication with $\text{conj}(Y)$, and integral – 5 points
 - Finishing the full expression – 5 points
- Exercise 2g:
 - Physical description – 5 points
 - Brief description of Michelson-Morley interferometry – 5 points

Exercise 3: (max 25 points)

- Each sub-problem can yield a total of 10 points, for a total of 30 points
- The final score for the main exercise is $25 * (\text{achieved score} / 30)$
- Exercise 3a
 - Explain birefringent material - 4 points
 - Explain ordinary and extraordinary rays – 3 points each
- Exercise 3b
 - Expression for phase difference – 5 points
 - Expression for time difference – 5 points
- Exercise 3c
 - Explains half-wave plate – 6 points
 - Explains what half-wave plates are used for – 4 points

Exercise 4: (max 25 points)

- Each sub-problem can yield a total of 10 points, for a total of 30 points
- The final score for the main exercise is $25 * (\text{achieved score} / 30)$
- Exercise 4a
 - Explains Fermat's principle – 10 points
- Exercise 4b
 - Write down Snell's law for diffraction – 4 points
 - Explains how n_i relates to speed of light – 3 points
 - Explains how Snell's law relates to Fermat's principle – 3 points
- Exercise 4c
 - Clear and easy to understand figure – 2 points
 - Sketch with correct angle – 4 points
 - Mark angle in figure – 2 points
 - Sketch has correct n_1 and n_2 - 2 points
- Exercise 4d
 - Shows that – 10 points
- Exercise 4e
 - Finds angle given by A and θ – 10 points
 - – 2 points per mistake
 - Only finding the deflection in the first refraction – 3 points
- Exercise 4f
 - Writes down Snell's law – 4 points
 - Shows given relation with Snell's law – 6 points
- Exercise 4g
 - Finds – 3 points
 - Finds - 3 points
 - Finds the angular dispersion – 4 points
- Exercise 4h
 - Gives correct answer – 5 points

- Argues why blue light is diffracted more than red light – 5 points
- Exercise 4i
 - Finds the correct angle – 10 points
- Exercise 4j
 - Finds correct angular difference in radians – 8 points
 - Correct angle in degrees – 2 points
 - – 3 points for answering mixing radians and degrees