

## COMPUTER SCIENCE TRIPOS Part II – 2017 – Paper 8

### 1 Advanced Graphics (RKM)

- (a) Two pigments used to dye fabric produce identical colour under fluorescent lighting but they differ when seen in sunlight. Explain how this is possible and what mechanism in the visual system gives the sensation of matching colours. Describe how light interacts with the pigments and produces the sensation of colour under different illumination. [8 marks]
- (b) Consider the design of a tone-mapping operator for a rendering engine used in a realistic cycling simulator. The simulator will be used to study how cyclists ride at night in low light conditions and in particular how well they can spot hazards. A typical, non-HDR LCD display will be used for the simulator.
- (i) What perceptual effects would you need to simulate in the tone-mapping operator? [4 marks]
- (ii) Illustrate a high-level design of such an operator on a diagram showing major processing blocks. Use a similar notation to that used in the lectures: blocks for processing, arrows for data. Describe the processing pipeline succinctly, stating the purpose and output of each processing block. Note that the problem can be solved in many ways and there is no single correct solution. [8 marks]