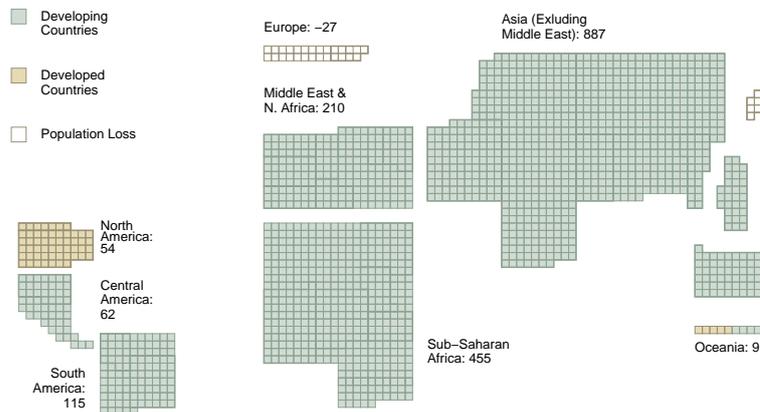


Answer all three questions. All are worth equal marks.

- The following graph is similar to one currently appearing in the on-line version of the *New York Times*. (You will be shown a colour version of the graph on screen).

Population Growth By 2025

By 2025, the United Nations estimates, humans will have increased their numbers by 31%. This map shows where all of the additional population will be in this middle-growth scenario. Each square represents 1 million more people (or a decline of 1 million) by 2025. Figures in millions.



- Describe all of the things that have been encoded graphically in this figure.
 - What do you think are the good and bad aspects of this graph? (You should relate your answer to what you know about perception and vision.)
 - Describe how you would go about producing this kind of graph with R. Note: I am only asking for an outline here, you do not need to write computer code.
- (a) An image of the world is projected through our eyes onto a two dimensional surface — the retina. Although this image is two dimensional we still perceive the world as being three dimensional. Describe some of the ways in which our vision system helps us to recover depth information about the world.

- (b) Describe ways in which our vision systems can be fooled into misinterpreting depth information.
 - (c) Give three examples of perceptual distortions which give rise to visual illusions. Give an example of a visual illusion which results from each kind of distortion.
- 3.
- (a) Explain formally what it means for colours to be complementary.
 - (b) Explain why the CIELUV space provides a more useful description of colour than the original CIE XYZ space.
 - (c) Explain where the use of colour is likely to be useful in graphical displays and where it might prove misleading.
 - (d) When we watch areas of blue and red at sundown, the red appears to fade as the light diminishes while the blue appears to brighten and glow (the Purkinje effect). Using what you know about the human vision system, explain why this is.