1. **Define the idempotence property that is satisfied by certain image operators.**
   It is the property of a function to be applied more than once and obtain the same results. $f\big(f(x)\big) = f(x)$
2.
   a. **Indicate whether dilations (δ_B) and erosions (ε_B) are idempotent.**
   false
   b. **Indicate whether openings (γ_B) and closings (φ_B) are idempotent.**
   true
   c. Indicate whether alternated filters ($\varphi_B\gamma_B$and $\gamma_B\varphi_B$) are idempotent.
   true
3. D. None is correct.
4. $\gamma_3 = \delta_3\varepsilon_3$
5. **Indicate a data structure that is useful for implementing efficient algorithms that travers all pixels in piecewise-constant regions (or flat zones).**
   A FIFO queue
6. **Consider a very simple neural network of just 1 hidden layer of 20 nodes for classifying 1 digits (base 10). If the input data are 28 × 28 gray-level images and there is one output per class, indicate the total number of nodes that compose the neural network (including the input layer, the hidden layer and the output layer). (Hint: remember an exercise regarding a very simple neural network to classify digit images using the MNIST database.)**
   $28 \cdot 28 + 20 + 10 = 814$ nodes
7. **Enumerate one segmentation algorithm based on neighbourhood processing**
   Wave propagation
8. **Enumerate the required steps for image classification.**
   - Image Preprocessing
   - Detection of ROI or objects
   - Feature definition and extraction
   - Training and Classification
9. **Define semantic image segmentation**.
   It is a technique that classifies pixels of an image into meaningful classes.
10. **What is oversegmentation (in the watershed algorithm), and how could we solve it?**
    Oversegmentation is when watershed algorithm makes the regions too small, we could get rid of it applying morphological transformations.