5. (a) Describe, using pseudocode or otherwise, the sorting algorithm *quicksort*. [5 marks]

(b) Illustrate your answer to (a) by showing the intermediate lists produced while applying quicksort to the following values:

2 9 1 7 8 4 0 [3 marks]

(c) What is the worst-case time complexity for quicksort? Justify your answer. [4 marks]

(d) What is the average-case time complexity for quicksort? Justify your answer. [4 marks]

(e) Define the concept of *stability* as it applies to a sorting algorithm. Is quicksort stable? Explain your answer. [4 marks]

(f) Define the concept of *adaptivity* as it applies to a sorting algorithm. Is quicksort adaptive? Explain your answer. [4 marks]