

Name \_\_\_\_\_

*No aids allowed. Answer all questions on test paper. Use backs of sheets if necessary.*

This is Kruskal's algorithm:

- 1: Sort the edges:  $c(e_1) \leq c(e_2) \leq \dots \leq c(e_m)$
- 2:  $T \leftarrow \emptyset$
- 3: **for**  $i : 1..m$  **do**
- 4:   **if**  $T \cup \{e_i\}$  has no cycle **then**
- 5:      $T \leftarrow T \cup \{e_i\}$
- 6:   **end if**
- 7: **end for**

Show that the following is a loop invariant: after Stage  $i$ ,  $T \cup \{e_{i+1}, \dots, e_m\}$  is connected, provided that the input graph  $G = (V, E)$  was connected.