Name: _____

1. (1 pt.)

   - **Read all material carefully.**
   - *If in doubt whether something is allowed, ask, don't assume.*
   - You may refer to your books, papers, and notes during this test.
   - E-books may be used *subject to the restrictions* noted in class.
   - No computer or network access of any kind is allowed (or needed).
   - Write, and draw, carefully. Ambiguous or cryptic answers receive zero credit.
   - Use class and textbook conventions for notation, algorithmic options, etc.

   Write your name in the space provided above.

2. (3 pts.) What is the asymptotic worst-case time complexity of Dijkstra's single-source shortest path algorithm when a binary heap is used for determining the next node to visit at each stage? Provide as accurate an answer as possible. Explain your answer briefly.

3. (3 pts.) Repeat Question 2 with binary heap replaced with pairing heap.

4. (13 pts.) Trace the execution of the Bellman-Ford single-source shortest paths (SSSP) algorithm on the following directed graph, with vertex A as the source. Use the textbook's Fig. 24.4 (p. 652) as a model. Relax edges in lexicographic order. Annotate predecessor edges with check marks.