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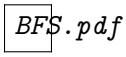
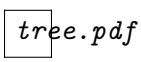
CSCI 3104, Algorithms **Profs. Chen & Grochow**
Quiz 6 **Spring 2020, CU-Boulder**

Instructions: This quiz is open book and open note, but **not** open-internet. You **may** post clarification questions to Piazza, with the understanding that you may not receive an answer in time and posting does count towards your 30 minutes. Questions posted to Piazza **must be posted as PRIVATE QUESTIONS.** Other use of the internet, including searching for answers or posting to sites like Chegg, is strictly prohibited. Any violation of the honor code is grounds to receive a 0 on this quiz. Proofs should be written in **complete sentences. Show and justify all work to receive full credit.**

Standard 14. *Consider the following graph with the source node s:*



Is it possible to obtain the following tree using BFS? Clearly justify your answer.



Starting at vertex s, in the first iteration, BFS will add nodes b and d to its queue adding each of the edges.
This comes with two situations:
- If b pops off, it will add a, f, and c.
- In other situation, if d pops off the queue first, then it will add c and f.

In other words, these two situations will not happen in the same tree because either b will add c and f, or d will add c and f
Therefore, it is not possible to obtain the following tree using BFS because we will not have an another edge to the node once a node has been discovered.