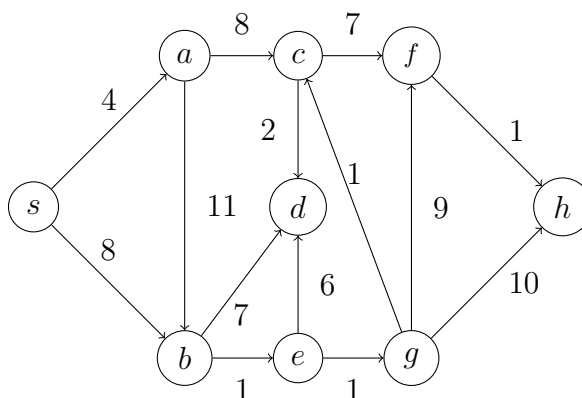
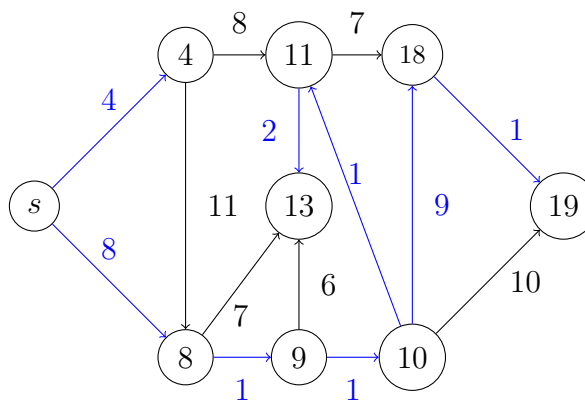


Assignment 5

1. I realized that due to the problem set being due Monday I never had you all do a trace through of Dijkstra's algorithm. So, no need to show work on this specific problem, but do produce the final result (ie the min distances from s to each vertex) of running Dijkstra's on the input below. I'm mostly adding this to make it clear that I'd expect a student of this class to be able to implement Dijkstra's in Java (or whatever language) if they ever needed to.



Solution:



2. Use the divide and conquer strategy developed in class to compute $1001_2 \times 1010_2$ (here the $\cdot_2$ means a binary number)

Solution: Let $u = 10_2$, $v = 1_2$, $x = y = 10_2$. Then $ux = 100_2$, $vy = 10_2$, $(u + v) = 11_2$, $(x + y) = 100_2$, and $(u + x)(v + y) = 1100_2$. Thus

$$\begin{aligned}
 1001_2 \times 1010_2 &= (u \times 100_2 + v) \times (x \times 100_2 + y) \\
 &= ux \times 10000_2 + (uy + vx) \times 100_2 + vy \\
 &= ux \times 10000_2 + ((u + v) \times (x + y) - ux - vy) \times 100_2 + vy \\
 &= 1000000_2 + (1100_2 - 100_2 - 10_2) \times 100_2 + 10_2 \\
 &= 1000000_2 + 110_2 \times 100_2 + 10_2 \\
 &= 1000000_2 + 11000_2 + 10_2 \\
 &= 1011010
 \end{aligned}$$