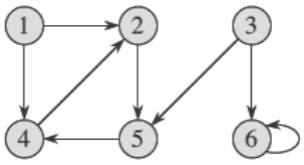

Figure 22.2(a)

22.2-1

Show the d and π values that result from running breadth-first search on the undirected graph of Figure 22.2(a), using vertex 3 as the source.

We begin at vertex 3 in the graph G, which we designate as the source s. s has the properties $s.d = 0$ and $s.\pi = \text{NIL}$. Each other vertex $u \in G$, $u.d = \infty$ and $u.\pi = \text{NIL}$. We begin with the queue Q and we enqueue s. Then, we continue to dequeue elements from Q and enqueue its adjacent neighbors, so long as we have not reached that neighbor before. We set $u.\pi$ as the parent of u and $u.d$ as the distance from s. Hence, we have the following queue

$$\begin{aligned}
Q &= [3] \\
&= [5, 6], \text{where } 5.\pi = 6.\pi = 3 \text{ and } 5.d = 6.d = 1 \\
&= [6, 4], \text{where } 4.\pi = 5 \text{ and } 4.d = 2 \\
&= [4] \\
&= [2], \text{where } 2.\pi = 4 \text{ and } 2.d = 3 \\
&= \emptyset
\end{aligned}$$