

# 50.021 Artificial Intelligence

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## Homework 2

### 1 Breadth-First Search (BFS) and Depth-First Search (DFS)

a) **Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: AC, ABD (no unexplored nodes available)

Step 4: AC, ABDX

**Solution:** ABDX

b) **Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: AB, ACD

Step 4: AB, ACDX

**Solution:** ACDX

c) **Performing BFS as tree search:**

**Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: ABA, ABC, ABD, ACA, ACB, ACD

**3 nodes:** ABA, ABC, ACA

d) **Performing DFS as tree search:**

**Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: ABA, ABC, ABD, ACA, ACB, ACD

**3 nodes:** ACB, ABCA, ABDC

### 2 More BFS/DFS

a) **Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: ABD, ACE, ACF

Step 4: ABD, ACF, ABDX, ABEH, ACEI (no unexplored nodes available)

**Solution:** ABDX

b) **Queue/ Steps:**

Step 1 - Start at A: A

Step 2: AB, AC

Step 3: AB, ACE, ACF

Step 4: AB, ACE, ACFI

Step 5: AB, ACE, ACFIH

Step 6: AB, ACE, ACFIHX

**Solution:** ACFIHX

### 3 Uniform Cost Search (UCS)

**Queue/ Steps:**

Step 1 - Start at A: A(0)

Step 2: AC(3), AB(5)

Step 3: AB(5), ACF(8), ACE(153)

Step 4: ACF(8), ABD(55), ACE(153)

Step 5: ACFI(11), ABD(55), ACE(153)

Step 6: ACFIH(14), ABD(55), ACE(153)

Step 6: ACFIHX(24), ABD(55), ACE(153)

**Solution:** ACFIHX