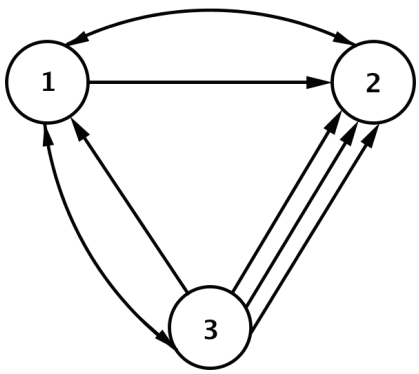
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

1. Consider the railroad map between Cities 1, 2, and 3, as shown on the right.



   A. How many different ways can you travel from City 1 to City 3 without passing through the same city twice?

There is only 1 way.
City 1 → City 3

   B. How many different ways can you travel from City 2 to City 3 without passing through the same city twice?

There is only 1 way.
City 2 → City 1 → City 3

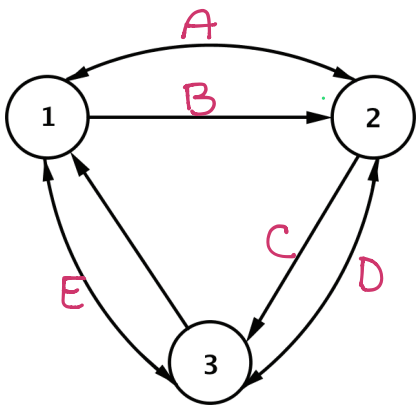
   C. How many different ways can you travel from City 1 to City 2 with exactly one connecting stop?

There are 3 ways. 1 → 3 → 2 (There are 3 ways from city 3→2)

   D. Why is this not a reasonable network diagram for a railroad?

More trains arrive in city 2 than leave and more trains leave city 3 than arrive.

2. Consider the subway map between stations 1, 2, and 3, as shown.



   A. How many different ways can you travel from station 1 to station 3 without passing through the same station twice?

5 ways
1 → 3
1 → 2 → 3 (4 ways)
• E
• A→D
• A→C
• B→D
• B→C

   B. How many different ways can you travel directly from station 1 to station 3 with no stops?

1 way 1 → 3 E

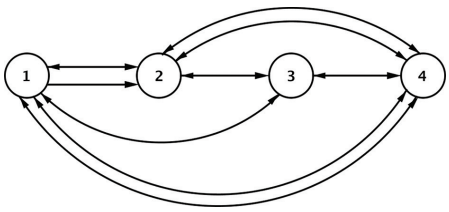
   C. How many different ways can you travel from station 1 to station 3 with exactly one stop?

4 ways 1 → 2 → 3
• A→D
• A→C
• B→D
• B→C

   D. How many different ways can you travel from station 1 to station 3 with exactly two stops? Allow for stops at repeated stations.

6 ways
1 → 3 → 1 → 3 (2 of these)
1 → 2 → 1 → 3 (2 of these)
1 → 3 → 2 → 3 (2 of these)

3. Consider the airline flight routes between Cities 1, 2, 3, and 4, as shown.



   A. How many different routes can you take from City 1 to City 4 with no stops?

2 routes

   B. How many different routes can you take from City 1 to City 4 with exactly one stop?

5 routes

1 → 2 → 4 (4 routes)
1 → 3 → 4 (1 route)

   C. How many different routes can you take from City 3 to City 4 with exactly one stop?

4 routes

3 → 1 → 4 (2 routes)
3 → 2 → 4 (2 routes)

   D. How many different routes can you take from City 1 to City 4 with exactly two stops? Allow for routes that include repeated cities.

28 routes

1 → 2 → 1 → 4 (4 routes)
1 → 3 → 2 → 4 (2 routes)
1 → 4 → 3 → 4 (2 routes)
1 → 2 → 3 → 4 (2 routes)
1 → 4 → 1 → 4 (8 routes)
1 → 3 → 1 → 4 (2 routes)
1 → 4 → 2 → 4 (8 routes)

   E. How many different routes can you take from City 2 to City 4 with exactly two stops? Allow for routes that include repeated cities.

27 routes

2 → 1 → 2 → 4 (4 routes)
2 → 3 → 2 → 4 (2 routes)
2 → 4 → 3 → 4 (2 routes)
2 → 1 → 3 → 4 (1 route)
2 → 4 → 1 → 4 (8 routes)
2 → 3 → 1 → 4 (2 routes)
2 → 4 → 2 → 4 (8 routes)