CEE 123 Transport Systems 3: Planning & Forecasting
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Homework 7 -- Trip Table Adjustments [Due: Monday 2 June 2025]

The following problems deal with a hypothetical, 4-zone region (this data was used in the prior homework assignment). Table 1 summarizes activity system and **HBW** trip generation data (Ps and As) for 2020, and estimates of activity system variables for 2030. Use the Table 2 base Trip Distribution in all problems.

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Table 1. Base and Future HBW Trips and Demographic Data Summary
------------------------------------------------------------------
        HBW        HH(i)        C(i)        W(i)        E(j)    I(i)
     P(i) A(j)  Households     Cars       Workers      Empl.   Inc.
Zone  '20  '20  ---------- ---------- ----------- ----------- -----
                '20  '30    '20  '30    '20  '30    '20  '30   both
------------------------------------------------------------------
  1   825  710  321  330    447  460    390  395    300  300    Low
  2   775  800  402  470    360  420    345  480    360  450    Med
  3   910  970  330  300    396  375    582  570    600  690   High
  4   865  895  375  420    450  465    399  450    456  455    Med
------------------------------------------------------------------
Tot 3375 3375  1428 1520   1653 1720   1716 1895   1716 1895    N/A
------------------------------------------------------------------


Table 2. Base Travel Time and Trip Distribution Matrix
------------------------------------------------------------------
From\To   1   2   3   4      From\To   1     2     3     4    P(i)
------------------------------------------------------------------
   1      5  16  13  18         1     250   125   375    75    825
   2     16   7  20  12         2     100   400    50   225    775
   3     13  20   2   9         3     205    60   225   420    910
   4     18  12   9   3         4     155   215   320   175    865
------------------------------------------------------------------
                                A(j)  710   800   970   895   3375
------------------------------------------------------------------
```

Problem 5. PA to OD by Time-of-Day (10 points)

Using the base 24-hour Home-based Work (HBW) person-trip production-attraction P-A matrix in Table 2 and the conversion factors in Table 5, **develop** the corresponding (a) AM-peak period, (b) PM-peak period, and (c) off-peak period origin-destination O-D matrices for HBW person-trips. Note: Show sample calculations.

```
Table 5. Temporal Distribution of Trips by Purpose
--------------------------------------------------------------------
                       --- HBW --     -- HBO --     -- NHB --
   Analysis Period     P-A    A-P     P-A    A-P     P-A    A-P
--------------------------------------------------------------------
 1. AM-peak (7-9:00am) 0.30   0.00    0.06   0.02    0.04   0.04
 2. PM-peak (4-7:00pm) 0.03   0.30    0.09   0.15    0.12   0.12
 3. Off-peak (other)   0.17   0.20    0.33   0.33    0.34   0.34
--------------------------------------------------------------------
```

Problem 6. Vehicle Occupancy (5 points)

Convert the AM-peak HBW O-D matrix of person-trips (see problem 5) to vehicle trips, using Table 6 parameters. **Express** as an O-D matrix.
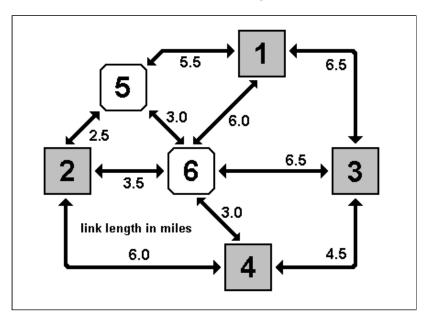
```
Table 6. Base Year Vehicle Occupancy by Trip Purpose
------------------------------------------------------------------
    Type        Trip purpose           Average Vehicle Occupancy
------------------------------------------------------------------
 1. HBW         Home-based Work         1.10 persons/vehicle
 2. HBO         Home-based Other        1.33 persons/vehicle
```

```
  3. NHB         Non-home-based                 1.25 persons/vehicle
-----------------------------------------------------------------
```

Problem 7. Identify Paths (10 points)

The following network represents the area in question, with node numbers 5 and 6 representing major network interchanges where no activities occur (these are not centroids). Links are labeled with link length (in miles). Assume for the AM-peak period average auto speeds of 30 mph.

Apply Dijkstra's Algorithm to find the minimum path tree for TAZ 1 (row 1 of the skim table). Inspect the network and apply symmetry to complete the skim table. **Verify** this skim table with that in Table 2. **Find** and **tabulate** predecessor nodes to identify the minimum paths for trip assignment.

Last Updated: 16 May 2025