Practice Problem #5: Maximum Flow Problem

Naval Airlines must determine how many connecting flights daily can be arranged between Fairbanks, Alaska, and Houston, Texas. Connecting flows must stop in Seattle or Portland and then stop in eitehr Los Angeles, Denver, or Phoenix. Because of limited landing space, Naval Airlines is limited to making the number of daily flights between pairs of cities shown in the table below.

Flight	Max # of Flights
Fairbanks-Seattle	15
Fairbanks-Portland	11
Seattle-LA	5
Seattle-Denver	12
Seattle-Phoenix	4
Portland-LA	6
Portland-Denver	7
Portland-Phoenix	11
LA-Houston	12
Denver-Houston	13
Phoenix-Houston	9

Table 1: Flight Capacities

1 Network Representation:

Draw a network representation below. Clearly label each arc as you see appropriate.

2   Concrete Model:

Formulate the problem above as a **concrete** mathematical programming model to maximize the total number of flights from Fairbanks to Houston. Clearly define and describe all decision variables, constraints, and the objective.

3   Abstract Model:

Formulate the problem above as a **abstract** mathematical programming model to maximize the total number of flights from Fairbanks to Houston. Clearly define and describe all sets, parameters, and decision variables.