1. The observed demands for a particular model of cellphone at 4 distribution centers are given in table Based on these data, predict the demand for the 12th quarter. Use simple moving average for Ranstin (try 2, 3, 4, 5 periods and pick the best one based on the lowest error), simple exponential smoothing for Swingate and Ulm (try seven values of alpha starting from 0.10 and up to 0.40 with a step size of 0.05; pick the best alpha based on the lowest error), and Holt's method for Bridgeport.

Table 1

Quarter	Ranstin	Swingate	Ulm	Bridgeport
1	36	97	48	25
2	25	78	35	27
3	48	78	69	36
4	52	105	61	40
5	39	83	76	42
6	60	58	39	48
7	48	65	48	45
8	75	89	22	63
9	5	73	32	74
10	17	65	85	85
11	35	90	59	89

2. Formulate the following facility location problem:
   The potential location of the facilities and their estimated throughputs are given in Table 2. The distribution centers are Ranstin, Swingate, Ulm, and Bridgeport. Recall that you predicted their 12th period's demand in problem 1. Now, use those demands for this problem formulation.
   Make reasonable assumptions about the distances, potential facility's average marginal facility cost (which is proportional to the number of units it produces to serve the destinations), fixed costs, average railway cost per mile per cellphone, and any other missing value. Assume that the return journey will be paid by the corresponding distribution center.

Table 2

Potential Facility	Maximum Throughput
Bakersfield	80
Harby	55
Fiskerton	95
Livington	75
Kimberly	59
Huddersfield	60
Osprey	99

3. Suppose that for some reason, Fiskerton is the only feasible location to set up the factory with 4 times higher throughput than defined in problem 2. Also, assume that Fiskerton is so well connected to all the distribution centers that we can approximate this problem as a continuous location problem. Determine the optimum location (x^*, y^*), and minimum cost. Make reasonable assumptions about the cost per mile per cellphone and the (x, y) coordinates. Provide a graphical illustration showing the optimum location of the facility.