

You and your team are hire as a consultant for a company that drills offshore oil wells. The company is assessing the possibility of setting some facilities to serve the offshore platforms. Initially, the new facilities will serve as a gathering center for supplies such as food, water, fuel, medicines, etc. Additionally, the new facilities will offer accommodation and recreation facilities for the offshore platforms crews that may have to work on different platform within the same shifts or that due the short length of some breaks may want to stay offshore instead of going back to mainland. There are several but limited potential facilities, given that the facilities must be situated on locations where the sea depth is not too big. The set of potential locations is given bellow. **On each potential location you can only place one facility.** There are five different types of facilities. The capacity and fixed charge cost are given bellow. The capacity is given as the number of individuals that the new facility can serve. The transportation cost of serving one individual located 1 mile away from the NF is 4.5 \$/individual-mile.

The oil company is interested in exploring:

- Should they consider **only one type** of facility? Which type of facility is the best option? Where should they locate them? (This are three different scenarios, one for each type)
- If they consider all types of facilities, how many NFs of each type and where should the build them. (This is only one scenario that considers all types)
- Currently, they are exploring new locations to drill more wells. Using sonar technology, they have reached several potential future wells. By experience they know that the potential requirements of the future wells will have the following distribution.

Platform Locations		
Lat	Lon	Demand (People to Serve)
9.1974476257655	-59.9915745346995	297
9.1017454549916	-59.6618869429895	148
9.2938188150067	-59.6706919680438	158
8.6978811339865	-59.2853485178396	278
8.5809335927864	-60.1482739413011	240
9.5824877712609	-59.4358922493162	162
8.7621996781446	-59.3647320909393	216
8.9529071529157	-59.7064700993013	284
9.0032266060436	-59.1354648650291	179
9.0692464858786	-59.7709287320287	161
9.3476621353426	-59.4888039684880	250
9.6121380872952	-60.2081078051775	239
9.3010714672193	-59.9544922890766	211
8.3127894389153	-59.6039365154773	252
9.2817231357857	-60.4355490102574	268
9.1863074063936	-60.3709030118657	197
8.9378122561806	-59.6143853855080	290

Potential New Facilities	
Lat	Lon
10.1456820518750	-58.5006564051250
9.8262918120123	-58.0420597068103
9.3116746965009	-59.1607188549847
9.6532174174726	-58.4462425327045
9.5748162422588	-57.9692388004635
9.2812761866752	-58.4843266918438
9.6083026196412	-57.4741522572648
10.3059226212862	-58.4830375354832

Facility Type	Annual Fixed Cost	Capacity (Number of individuals)
#1	5,000,000	250
#2	2,500,000	100
#3	16,000,000	750
#4	8,000,000	380
#5	14,500,000	600

Set of possible new wells for part C)

New Locations		Estimated Demand	Probability that the Well will be productive
9.9452484278363	-60.3339011646475	191	0.75
9.9064808806187	-60.3824567795043	179	0.4
9.4443838310416	-60.2615624276190	113	0.68
9.0336909008250	-60.0827800401162	194	0.2
9.1291816432187	-60.6919902957051	140	0.85
9.7660407971830	-60.5443180219477	175	0.3