MATH 223   Spring, 2025
A Location Problem

The Middlebury Institute of International Studies at Monterey offers a number of graduate programs in international policy studies, global security, public administration, translation, teaching of English as a Second Language, trade policy, etc. at its Monterey California campus. These are all areas of interest to a number of Middlebury students and faculty.

The Biosphere 2 Center in Oracle, Arizona (near Tucson) is a research facility for examining how Earth's biosphere will change as carbon dioxide and other substances build in the atmosphere. The facility houses seven wilderness ecosystems, including a rainforest and a 3,400,000 liter (900,000 gallon) ocean, as well as a human habitat which now houses interactive exhibits. The University of Arizona is the current owner of the $150 million facility and may be willing to sell it. Some Middlebury Environmental Studies students and faculty would like to see our college purchase the Biosphere.

Suppose Middlebury College owns both facilities. The College determines that it will need to have a small full time staff of five people who will coordinate programs at Monterey, Oracle and Middlebury VT. It is estimated that the entire staff will have to travel as a group to Middlebury six times a month, to Oracle three times a month and to Monterey four times a month. The group will have its own corporate jet (a SyberJet SJ30i) which is capable of landing at the small airports in each of the three towns. When the group is not traveling, it will work out of an office somewhere in the United States.

You are asked to advise the group where it should locate this office if it wants to minimize its travel costs. It costs $13.74 per mile to operate the SyberJet SJ30i.

Discuss how you would determine the ideal location for the office. Is there some sort of a function which will produce the total transportation cost if the location of the office is known? How many variables would such a function take as input? What further information would you need to formulate the function? Where could you get the information?