

Everyone should be a member of a group consisting of 2-4 individuals that will meet out of class to work on the following problem. (On the last project some groups were larger than 4, this will not be excepted this time.) You are to pretend that you are a small consulting firm under contract with an oil company to advise the most economical route for a pipeline. As before come up with a clever name for your company. Your report should contain a concise statement of the problem, clear non-technical recommendations to the company, and supporting technical (mathematical) justification for your conclusions. The project will be due after exam #2 on Thursday, November 3, but you should get started well before then.

Attached is a section of the U.S. Geological Survey contour map for northeastern Ohio, with wetland (swamp) area outlined in bold for clarity. An existing oil well is located at the spot labeled B, from which a distribution pipeline originates. If a new well is dug at spot A, then a connecting pipeline to B must be constructed. Here are the costs involved.

- (1) Straight, 2 inch coated pipe costs \$1.50/foot.
- (2) At most two elbow joints can be used (but the angles do not have to be right angles).
- (3) Over normal terrain installation costs \$1.20/foot.
- (4) Installation in a wetland area must be elevated, which requires use of special equipment at \$60.00/hour (on top of the normal installation cost).
- (5) With this equipment it takes 10 hours to elevate 300 feet of pipeline.

Assuming no environmental restrictions exist, determine the most economical route for the pipeline. You may want to first solve the problem with a simple model, taking the wetland to be a rectangle. Look at a variety of different routes, and see if you can reduce this number to just a few basic types. For example, there isn't much point going around the swamp to the north, since this path is longer than going around to the south, and both traverse only normal terrain. If you have a satisfactory solution with a rectangular model, try making a more sophisticated model.

Important: To make sure that everyone does their share all the reports will contain a paragraph with a list list of your names and what percent of the work the group felt that each member did. Thus if the group has four members with names A, B, C, D, and everyone did the same amount of work then the list would look like A 25%, B 25%, C 25%, D 25%, but if it turned out that A did half of the work and B did almost none, then the numbers might look like A 50%, B 5%, C 20%, D 25%. These numbers will not effect your grade, other than if at the end of the term you are on the border line between grades, then this is one of the factors I will look at.