Project 1: Cost of Cable   **Group #:**

You work for the Silver Satellite & Cable TV Company in the Research & Development Department. You have been asked to come up with a formula to determine the cost of running cable from a connection box to a new cable household. The customer pays the cost of laying the cable, and the company expects to make its profits on the cable subscriptions. The first example that you are working with involves the Steven family, who own a rural home with a driveway 2 miles long extending to the house from a nearby highway. The nearest connection box is along the highway but 6 miles from the driveway.

It costs the company $175 per mile to install cable along the highway and $290 per mile to install cable off the highway. Because the Steven's house is surrounded by farmland that they own, it would be possible to run the cable overland to the house directly from the connection box or from any point along the highway between the connection box and the driveway.

a) Draw a sketch of this problem situation, assuming that the highway is a straight road and the driveway is also a straight road perpendicular to the highway. Using a different color for each cable, include two or more possible cable routes. *Use a ruler. Label your sketch clearly.*

b) Let x represent the distance in miles that the cable runs along the highway from the connection box before turning off toward the house. Express the total cost of installation as a function $C(x)$ of x, and state its domain. (You may choose to answer part (c) before part (b) if you would like to examine concrete instances before creating the equation.)

   $C(x) = $ _____ Domain:_____ Range (see also part d):_____

c) Make a table of the possible integral values of x and the corresponding cost in each instance. Among these, does one choice appear to cost the least?

x [mi]	0	1	2	3	4	5	6
Cost							

d) Using a graphing calculator, graph the function from part (b) and determine the value of x that would make the installation cost minimum (round your answer to two decimal places).

                                                      Minimum cost occurs for $x = $ _____

e) If you charge the Stevens $1850 for installation, would you be willing to let them choose which way the cable would go? Explain.

f) Before proceeding further with the installation, you check the local regulations for cable companies and find that there is pending state legislation that says that the cable cannot turn off the highway more than 0.75 mile from the Steven's driveway. If the legislation passes, what will be the ultimate cost of installing Steven's cable?

                                                                       Cost = _____

g) If the cable company wishes to install cable in 5000 homes in this area, and assuming that the figures for the Steven's installation are typical, how much will the new legislation increase the installation cost for the company above the cheapest installation cost?

                                                                       Cost = _____

Name and signature (first submission only):