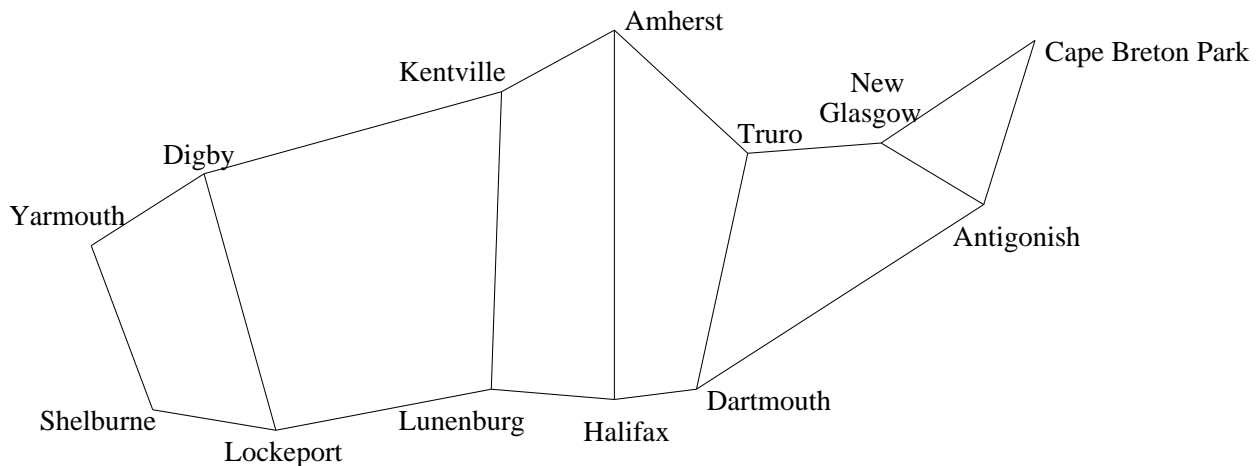


Problems For Tour 1

1. Due to a labour dispute at McDonald's, employees have decided to serve Chicken McNuggets only in packages of 6 and 20. Under this new system, is it possible to purchase *exactly* 2001 Chicken McNuggets? Explain your answer carefully.
2. There are 5 red marbles and 6 green marbles in a jar. Elizabeth plays a strange game. She removes two marbles at a time, with the following rules:
 - a) If the marbles are both green, she puts one green marble back.
 - b) If there is one marble of each colour, she puts one red marble back.
 - c) If the marbles are both red, she puts one green marble back.
 At the end, there will be one marble left. Which colour is it?
3. Consider an 8 by 8 chessboard. I cut two diagonally opposite squares and throw them away. So there are now 62 squares left. Can I tile this modified board with exactly 31 dominoes? (In other words, can I place the 31 dominoes on the board so that every square is covered?)
4. Garrett has stolen a million dollars from Victoria, and has run away with it. Victoria discovers this and wants to get her money back. Victoria starts in Lockeport, and Garrett starts in Yarmouth. Because of road construction, it is only possible to travel between certain cities, as indicated in the diagram below. They take turns moving, and Victoria gets her money back by moving to the city that Garrett is at. Victoria moves first. Can Victoria get her million dollars back? If so, how? If not, explain why.



5. If a , b , and c are odd integers, prove that the polynomial $ax^2 + bx + c$ cannot have a *rational* root.