4. [12 points]   Zeno's paradox says that one can never arrive somewhere because one must always first travel half-way there—and that having traveled half-way there, one must travel half of the remaining distance, then half of the distance remaining after that, etc.

     (a) [4 points of 12]   Suppose that you start with the goal of traveling 20 km. Let d_n be the total distance that you have gone after having traveled the nth half-distance to your goal. Find d_1, d_2, d_3 and d_4.

     (b) [6 points of 12]   Find a closed-form expression for the distance you've traveled after n half-distances.

     (c) [2 points of 12]   What is the sum as the number of half-distances traveled goes to infinity? (That is, how far do you travel if you continue "forever"?)