# Problem Set 2: Due 9/6/2021 at 11:59 pm (EDT on Brightspace)

1. The city of Schitt’s Creek is reconsidering how many plays to put on in the park per year (i.e. the outdoor play is the public good). Suppose that Stevie and Moira are the only residents in Schitt’s Creek. The only other good in Schitt’s Creek is a private good, candles. Stevie and Moira have the same utility function (below) where “i” can stand in for “S” for Stevie or “M” for Moira. They also have the same income, $24, to split between buying plays and candles. The price of a candle and one play are both $1 (for simplicity).
   1. Explain why, or to what extent, plays (outdoor ones, specifically) meet the criteria of a public good.
   2. Use consumer optimization in order to find the private solution. In other words, without government intervention, how many plays will Moira provide? How many will Stevie provide?
   3. Suppose that the socially optimal quantity is 28 plays, and the government wants to make sure that exactly that amount is provided. The mayor assumes that Stevie and Moira will behave as you described in part b, so how many plays will the mayor make sure the city provides to cover the shortfall?
   4. The mayor announces that the city will provide these additional plays (the shortfall) discussed in part c *before* Stevie and Moira make their decision, and he decides to split the cost evenly between Stevie and Moira. If Stevie and Moira make their consumption decisions with this in mind, will 28 hours be provided? Again, use consumer optimization to support your answer.
2. Bob has a motorcycle. He enjoys riding it, but it is a high emission vehicle. Every mile he rides his motorcycle results in an externality for the community. Bob’s marginal benefit per mile is 30 – 4Q. Gas for the motorcycle isn’t free, so his marginal private cost per mile is 10. In summary:

MPC = 10

MB = 30 – 4Q

* 1. Based on this information, how many miles will Bob ride? I.e. what is the “private solution.”
  2. The emissions from the motorcycle cause a negative externality (MD = 5 + Q). What is the marginal social cost (MSC) *equation* of Bob’s motorcycle riding? (Your answer should be an equation with Q in it.)
  3. What is the socially optimal number of miles?
  4. Graph this scenario. Label all intercepts, curves and axes.
  5. How much surplus does Bob lose by reducing to the socially optimal quantity?
  6. How much does the community gain in reduced damage because Bob has reduced his riding?