**The Externalities Game (TEG)**

To obtain a deeper understanding of the concepts reviewed so far, class time will be devoted to playing the *Externalities Game.* By definition, an externality is a second party effect arising from the production and/or consumption of goods and services for which no appropriate compensation is paid. For example, in climate change an externality would be sea level rise or global temperature change. Like the noncooperative games discussed previously, the Externalities Game has an underlying structure that creates tension between individuals who seek to achieve personal wellbeing at the expense of communal wellbeing. In this game, the outcomes that impact each player are determined, in part, by the actions of other players. Here is a general description of the game:

**Rules:**

* Players are randomly assigned one of three production roles: luxury, intermediate, and subsistence.
* Students must make production decisions that result in points (for themselves) and externality costs (shared by everyone). Whereas points accumulate linearly with production, costs expand exponentially.
* Luxury players gain the most points per unit of production, but also emit the greatest amount of externalities. Intermediate players gain the second most points per unit of production, and emit the second highest amount of externalities. Subsistence players gain the least amount of points per unit of production, but emit the least amount of externalities.
* The units of production are constrained differently depending on the role assigned:
  + Luxury players may produce between *0 and 10 units*
  + Intermediate players may produce between *0 and 55 units*
  + Subsistence players may produce between *0 and 240 units*
* Grades are determined by the points that are produced individually, minus the social costs that are produced collectively.
* A round of game play consists of two steps: 1) simultaneous production decisions by all players, followed up by, 2) simultaneous point-sharing decisions.
* Players can only produce whole goods up to their maximum production capacity and not less than 0. (No negative production).
* Players can share (or bequeath) grade points after each round.
* Players can make deals during the game to share points or limit production for the greater good, however the Instructor cannot enforce agreements. Players may lie to each other about their behaviors, and in many cases these lies may go undetected.
* Players do not have to share with anyone if they do not choose to. The people they share with and they amount they share is solely of their own discretion and will be kept confidential.
* Players can get above 100% as their final grade for each round, but they can get no less than a 0.

**Play:**

* Players are allowed to experiment with various production choices. The consequences of their production choices may not be fully attained until after the first round has been played, and if the instructor chooses, the first round can be considered a “practice round”. Players will continue to experiment and try to make deals with each other to attain their wanted grades.
* To experiment with possible choices, players can enter their production decision into the computer and view the consequences of that decision. If the players do not want to cooperate with the other players, then they do not have to, but it is in their best interest to do so.
* When all players have come to a final decision, or when the instructor states that deliberation must end, the players will submit their final production value. \*THIS VALUE DOES NOT HAVE TO BE WHAT WAS AGREED UPON WITH THE OTHER PLAYERS\*
* The grades are then calculated by the instructor’s program, and they are returned to the students with a list of emissions generated by each player. Another round may be played if the instructor so chooses.
* When all rounds have been played, the grades are calculated based upon an average of all grades through all rounds. Their final grade for this part of the game will be recorded and carried on through the next game.

**Your Turn to Experiment:**

Provided is a copy of the excel program used to calculate the resulting grades for each round of game-play (TEGspreadsheet.xls). Feel free to experiment with different decision making scenarios before playing the game in class with your fellow students. The spreadsheet is divided into three sections, representing the three production roles: Luxury, Intermediate, and Subsistence. The randomly assigned player codes are listed along the left hand side of each section and the production decisions of each player are entered into the red columns, labeled *production*. The resulting grades of each player are then displayed in the blue columns, labeled *grade*. A class average grade is calculated and highlighted in red near the bottom of the spreadsheet. Keep in mind that in the second part of each round, there is an opportunity for players to share grade-points.