# 1.5 Preferences II: MRS and Utility Functions - Practice Problems

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**1. For each question, draw an indifference curve relating the two objects (label it $I_1$). Draw and label a *second* curve that gives *higher* utility (label it $I_2$), and a *third* curve that gives *lower* utility (label it $I_0$).**

**a. *Oranges* (a good) on the horizontal axis and *Pollution* (a bad) on the vertical axis.**

**b. *Pollution* (a bad) on the horizontal axis and *Oranges* (a good) on the vertical axis.**

**c. *Pollution* (a bad) on the horizontal axis and *Garbage* (a bad) on the vertical axis.**

**d. *Butter* on the horizontal axis and *Margarine* on the vertical axis. Both are goods, and you are always willing to trade between them at a 1:1 rate.**

**e. *Cars* on the horizontal axis and *Tires* on the vertical axis. Both are goods, and you are always want to consume them at a 1:4 proportion. (Draw these carefully!)**

**2. Suppose you can watch movies in the theater ($t$) and streaming at home ($s$), and earn utility according to the utility function:**

$$u(t,s) = 4ts$$

Where your marginal utilities are:

$$MU_t = 4s$$
$$MU_s = 4t$$

**a. Put $t$ on the horizontal axis and $s$ on the vertical axis. Write an equation for $MRS_{t,s}$**

**b. Would bundles of $(2,2)$ and $(1,4)$ be on the same indifference curve?**

**c. Is this curve convex? Hint: Does $MRS_{t,s} \downarrow$ as $t \uparrow$?**

**d. Sketch this indifference curve.**