# Problem Set #1

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**Problem 1** Classify a model from a journal:

**Part (a).** The article chosen is "Impatience and Uncertainty: Experimental Decisions Predict Adolescents' Field Behavior" from the *American Economic Review*.

**Part (b).** Sutter, Matthias, Martin G. Kocher, Daniela Glätzle-Rützler, and Stefan T. Trautmann. "Impatience and uncertainty: Experimental decisions predict adolescents' field behavior." American Economic Review 103, no. 1 (2013): 510-31.

**Part (c).**

$$P(y_{savings} = 1|X) = \phi(\beta_0^1 + \beta_1^1 * x_{impatience} + \beta_2^1 * x_{age} + \beta_3^1 * x_{math\_grade}) \quad (1)$$

$$P(y_{smoking} = 1|X) = \phi(\beta_0^2 + \beta_1^2 * x_{impatience} + \beta_2^2 * x_{ambiguity_aversion} + \beta_3^2 * x_{age} + \beta_4^2 * x_{gender} + \beta_5^2 * x_{math\_grade}) \quad (2)$$

$$P(y_{alcohol\_consumption} = 1|X) = \phi(\beta_0^3 + \beta_1^3 * x_{impatience} + \beta_2^3 * x_{age} + \beta_3^3 * x_{weekly\_pocket\_money}) \quad (3)$$

$$y_{BMI} = \beta_0^4 + \beta_1^4 * x_{impatience} + \beta_2^4 * x_{risk\_aversion} + \beta_1^4 * x_{gender} + \beta_1^4 * x_{weekly\_pocket\_money} \quad (4)$$

$$P(y_{conduct\_grade} = 1|X) = \phi(\beta_0^5 + \beta_1^5 * x_{impatience} + \beta_2^5 * x_{gender} + \beta_3^5 * x_{german\_grade} + \beta_4^5 * x_{math\_grade}) \quad (5)$$

**Part (d).**
**Exogenous variables**: Variables measuring impatience, risk aversion, ambiguity aversion, age, gender, german grade, math grade, number of siblings, and pocket money per week.
**Endogenous variables**: Variables measuring saving habit, smoking, alcohol consumption, BMI (Body Mass Index), and grade for conduct at school.

**Part (e).** The models are static, linear, and deterministic.

**Part (f).** The student's socio-economic background can also be a significant determinant of risky behaviour. Hence a categorical variable indicating the family

income of the student can also be added for better analysis.

**Problem 2** Make your own model:

**Part (a).** Since the outcome is binary, a logit regression model is chosen. The output is taken as 1 if $P >= 0.5$ and as 0 if $P < 0.5$.

$$P(Marriage) = \frac{1}{1 + exp(-\beta * X)} \tag{6}$$

$$\begin{aligned} \beta * X = (\beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3 + \beta_4 * x_4 + \beta_5 * x_5 \\ + \beta_6 * x_6 + \beta_7 * x_7 + \beta_8 * x_8 + \beta_9 * x_9 + \beta_{10} * x_{10}) \end{aligned} \tag{7}$$

The primary assumption in the model is that you already have an SO ('marry yourself' not considered here). If not, then P is de facto = 0. The variables chosen for the model are (1) your affinity towards your SO, (2) your SO's affinity towards you, (3) your age, (4) your gender, (6) time you've lived together with your SO, (7) sum of yours and your SO's assets, (8) sum of yours and your SO's incomes, (9) your family's affinity towards your SO, (10) your SO's family's affinity towards you.

I think the significant variables would be each other's affinity, financial stability, gender. The first two factors are frequenty cited in many online articles [1 - 4] and is influenced by observation. Third is from the fact that in almost all countries, the age of first marriage is significantly lower for women as compared to men [5]. There is varying opinion about the importance of the other factors as per personal observations. Hence, I expect to see larger heterogenity in the other factor and hence there is higher probability of them not being important.

A preliminary test could be to sample and survey a set of couples (married and unmarried). Diversity of the couple (homosexual/heterosexual, representation of cultural groups and geography etc.) is important to avoid biases. Then the data obtained should be split into training and test set. If the model obtained can successfully predict the marriage status of the test set couples using the training set, then we could say that the model is robust and valid.

**References:**


1. https://www.psychologytoday.com/us/blog/meet-catch-and-keep/201710/how-long-should-you-date-getting-married
2. https://www.thespruce.com/if-you-are-marrying-the-one-2302205
3. https://www.brides.com/story/are-you-ready-for-marriage
4. https://www.lifehack.org/articles/communication/14-questions-everyone-should-able-answer-before-getting-married.html
5. https://en.wikipedia.org/wiki/List_of_countries_by_age_at_first_marriage