# Week 10 Quiz

## Question 1

1/1 point (graded)

When the dependent variable is Bernoulli, a logistic regression is useful because

- it insures the independence of the variables
- it reflects the nonlinearity assumption of the expected mean of Y
- it allows for bounding the expected mean of Y ✔
- all of the above

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Answers are displayed within the problem

## Question 2

1/1 point (graded)

We use maximum likelihood to fit a logistic regression because

- it insures the linearity of the model
- it returns the parameters values that are most likely to have generated the data ✔
- it guarantees the significance of all the parameters

- all of the above

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## Question 3

1/1 point (graded)

After fitting a logistic regression over the bids, the pricing should be such that

- it maximizes the expected profits given the estmated probabilities of accepting a bid ✔
- it reduces the variance of the projected bid acceptance probabilities
- it guarantees at least half of the probabilities of choosing the bids to be equal to 0.5
- all of the above

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## Question 4

1/1 point (graded)

How do we deal with having more than one independent variable that influence the pricing strategy

- we run a logistic regression for each veariable with different intercepts

- ◉ we incorporate all of them in the linear utility of the same logistic regression ✔
- ○ we run several logistic regressions each with only one variable and retain the one with the lowest BIC value

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ℹ Answers are displayed within the problem

## Question 5

1/1 point (graded)
Prospect theory states that the value function

- ◉ is judged relative to a reference point ✔
- ○ increases for losses and decreases for gains
- ○ all of the above

**Explanation**
The value function is reference dependendent and increases for gains and decreases for losses with diminishing returns

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This part of the Quiz requires you to perform some calculations.
When you are asked to report a probability, you are expected to report a number between 0 and 1.

All your inputs should be rounded to the second decimal. For example:

- if you obtain 0.973 report 0.97
- if you obtain 0.975 report 0.98
- if you obtain 0.976 report 0.98

## Question 6

1/1 point (graded)
Assume that the logit of the probability is ln(p(x)/(1-p(x))) = 1.10 + ln(x).

Compute the probability of success of x = 1.
Your answer must be between 0 and 1 and rounded up to 2 decimals.

0.75 ✔ **Answer:** 0.75

*[Math Processing Error]*

**Explanation**
exp(1.1)/ (1+exp(1.1)) = 0.75

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Answers are displayed within the problem

## Question 7

1/1 point (graded)
Prospect theory suggests that reference price effects are asymmetric, where losses loom larger than gains.

Consider two features 1 and 2 and assume that losses have a double effect on the utility than gains for both of them.

Let the reference value for the first feature be 5 and 4 for the second feature.

What is the probability of accepting product A that has a measure of x1 = 3 for the first feature and a measure of x2 = 6 for the second feature (assume a null intercept)?
Your answer must be between 0 and 1 and rounded up to 2 decimals.

0.12 ✔ **Answer:** 0.12

*[Math Processing Error]*

**Explanation**

The utility of A is u = 2*(3-5) + (6-4) = -4 +2 = -2, because the first feature x1 is below the reference point while the second feature x2 is not. Applying the logit probability, we have: p = exp(-2)/ (1+exp(-2)) = 0.12

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Answers are displayed within the problem

A manager is interested in investigating new models in order to improve her pricing strategies. The analyst of the group suggests adding a non linearity to the model because it could allow to capture more variability of the data. After obtaining bids acceptance data from 1000 consumers, the analyst fits two models:

- Model 1: the logit of the porbability is assumed to be linear. After maximizing the likelihood the analyst obtains the following expression for the logit of the probabilities ln(p(x)/(1-p(x))) = 8 - 4*x.
- Model 2: the logit of the porbability is assumed to be quadratic. After maximizing the likelihood the analyst obtains the following expression for the logit of the probabilities ln(p(x)/(1-p(x))) = 3 - 3*x + 0.5*x^2

The maximum log-likelihood value of the first model is -500 and -498 for the second model.

## Question 8

1/1 point (graded)

Compute the BIC value of model 1.

Round your solution to the second decimal.

1014 ✔ **Answer:** 1014

*[Math Processing Error]*

**Explanation**

BIC = 2*500 + 2 * ln(1000) = 1013.82

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Answers are displayed within the problem

## Question 9

1/1 point (graded)

Compute the BIC value of model 2.

Round your solution to the second decimal.

1017 ✔ **Answer:** 1017

*[Math Processing Error]*

**Explanation**

BIC = 2*498 + 3 * ln(1000) = 1016.72

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Answers are displayed within the problem

## Question 10

1/1 point (graded)

Which of the two models (model 1 and model 2) is preferred

- the model with the hishest BIC value
- the model with the lowest BIC value ✔
- the model with the highest log-likelihood value
- the model with the lowest number of paramters because it is simpler
- the model with the highest number of paramters because it is more complex

**Explanation**

The BIC value balances between the fit of the data and the complexity of the model. A preferred model has a low BIC value compared to the other.

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