Week 4 Quiz

Q1

1/1 point (graded)

When analyzing binary choice data, why can't we use regression analysis where the binary (0/1) choice is the dependent variable and the x's are independent variables?

- Regression predictions could be outside the [0, 1] interval
- Wrong statistical inference/tests
- All of the above (a and b) ✔
- None of the above

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Answers are displayed within the problem

Q2

1/1 point (graded)

In binary choice modeling, why do we set the utility of one of the alternatives (e.g., utility from not buying) to zero?

- Utility is relative ✔
- Utility is cardinal

- None of the above

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Answers are displayed within the problem

Q3

1/1 point (graded)

Let p1 = exp(a)/(exp(a) + exp(b) + exp(c)) and p2 = exp(a-c) / (exp(a-c) + exp(b-c) + 1). Which statement most accurately describes the relationship between p1 and p2?

- p1 = p2 ✔
- p1 is less than or equal to p2
- p1 is greater than or equal to p2
- None of the above

Explanation

Multiply p1 by exp(-c)/exp(-c)=1:
p1 = p1 * exp(-c)/exp(-c) =
exp(a)/(exp(a) + exp(b) + exp(c))*exp(-c)/exp(-c) =
(exp(a)exp(-c)) / (exp(a)exp(-c) + exp(b)exp(-c) + exp(c)exp(-c)) =
exp(a-c) / (exp(a-c) + exp(b-c) + exp(c-c))=
exp(a-c) / (exp(a-c) + exp(b-c) + 1) = p2
The last equality holds because exp(0)=1

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Q4

1/1 point (graded)

If the utility from buying is estimated to be equal to one for a consumer (V=1), and the utility from not buying is normalized to zero, what is the probability of buying for this consumer?

- 22.9%
- 50%
- 73.1% ✔
- 100%

Explanation

p = exp(V)/(1+exp(V))=e/(1+e)=73.1%

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Answers are displayed within the problem

Q5

1/1 point (graded)

If the utility from buying is estimated to be equal to one for a consumer (V=1), and the utility from not buying is normalized to zero, what are the odds of buying for this consumer?

- 1.0
- 0.3678
- 2.718 ✔
- Infinity

Explanation

Odds = (exp(1)/(exp(1)+1)) / (1/(exp(1)+1)) = exp(1) / 1 = exp(1) = e = 2.718

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Answers are displayed within the problem

Q6

1/1 point (graded)

In a logistic regression output, we obtained a chi-square (likelihood ratio) statistics of 101.1 and a p-value of 0.0001. Recall, the reference in the test is the intercept-only model. How do you interpret this result?

- Our independent variables significantly impact the binary outcome. The probability of observing a chi-square value as low as 101.1 is 0.0001 if the null hypothesis (no relationship between the independent variables and the binary outcome) is not true.
- Our independent variables do not significantly impact the binary outcome. The model has only 0.0001 chance to be true.
- Our independent variables significantly impact the binary outcome. The probability of observing a chi-square value as large as 101.1 is 0.0001 if the null hypothesis (no relationship between the independent variables and the binary outcome) is true. ✔
- Our independent variables do not significantly impact the binary outcome. The probability of such an event is 1 - p-value= 0.9999.

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Answers are displayed within the problem

Use this logistic regression output to answer questions 7, 8, 9.

Logistic Regression Output

	Beta	SE	Zval.	Prob(>|Z|)	exp(beta)
Intercept	-0.847	0.691	-1.226	0.22	0.429
Gender [Male=0]	1.695	0.701	2.418	0.031	5.447

To clarify, we use dummy coding for Gender variable: Male=0, Female=1.

Q7

1/1 point (graded)

In the logistic regression output above, the dependent variable is buy (=1) and no-buy (=0). The independent variable is Gender (Male=0; Female=1). What is the utility from buying for a female consumer?

- 1.695
- -0.847
- 0.848 ✔
- None of the above

Explanation

1.695-0.847 = 0.848

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Answers are displayed within the problem

Q8

1/1 point (graded)

In the logistic regression output above, the dependent variable is buy (=1) and no-buy (=0). The independent variable is Gender (Male=0; Female=1). How would you interpret the exp(beta) = 5.447 value for gender?

- The odds of buying for a female consumer are 5.018 (=5.447-0.429) times higher than those of male consumer.
- The odds of buying for a female consumer are 5.447 times higher than those of a male consumer. ✔
- The odds of buying for a male consumer are 5.447 times higher than those of a female consumer.
- None of the above

Explanation

See lecture on output interpretation for logistic regression.

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Answers are displayed within the problem

Q9

1/1 point (graded)

In the logistic regression output above, what is the probability of purchase for a male consumer?

- 0.3 ✔
- 0.7
- 0.16
- None of the above

Explanation

exp(-0.847) / (exp(-0.847) + 1) = 0.3

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Answers are displayed within the problem

Q10

1/1 point (graded)

In a dataset of buy/no buy, we obtained a hit rate of 91%. If the proportion of buyers in the sample is 90.9%, how would you assess the value of such a hit rate?

- ○ Excellent hit rate. The max hit rate is 1, so 91% is really good.
- ○ Hit rate is OK. Very close to 100%.
- ◉ Poor hit rate since we can assign all the consumers as buyers and get a hit rate of 90.9%. This value is no different than the hit rate of 91%. ✔
- ○ None of the above.

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Answers are displayed within the problem

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