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## Logistic Regression Quiz

LATEST SUBMISSION GRADE

100%

1. Imagine that you are collecting variables while participants attempted to shoot a soccer ball. Which of the following collected variables could be predicted using a logistic regression model?

1 / 1 point

☒ Whether a shot on goal traveled more than 20 feet

✓ Correct

☒ Sex (male vs. female)

✓ Correct

☐ Height

☒ Scoring a soccer goal on a given shot

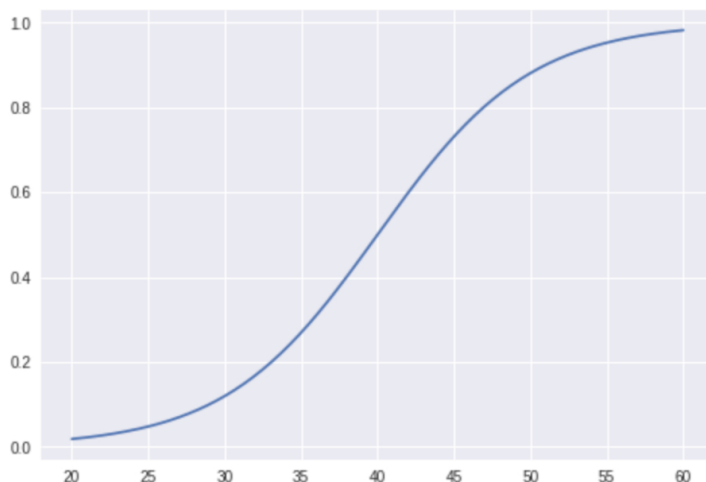
✓ Correct

☐ Age (years)

2. Which of the following is a possible form/shape for a logistic regression model, where the y-axis represents the probability of success?

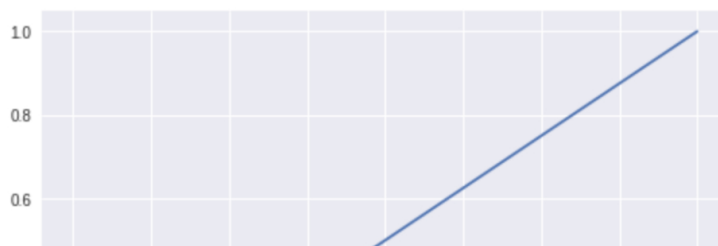
1 / 1 point

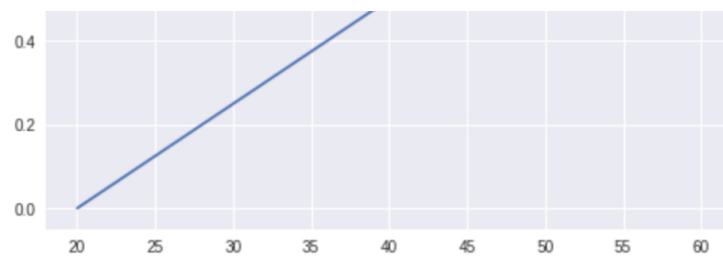
☒ Graph:



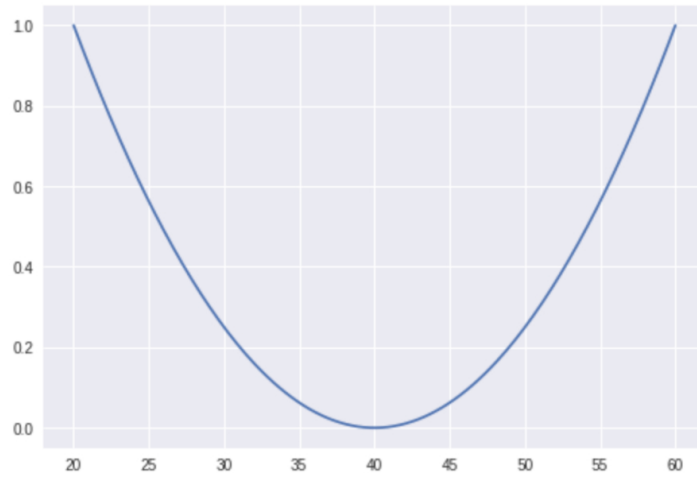
✓ Correct

☐ Graph:

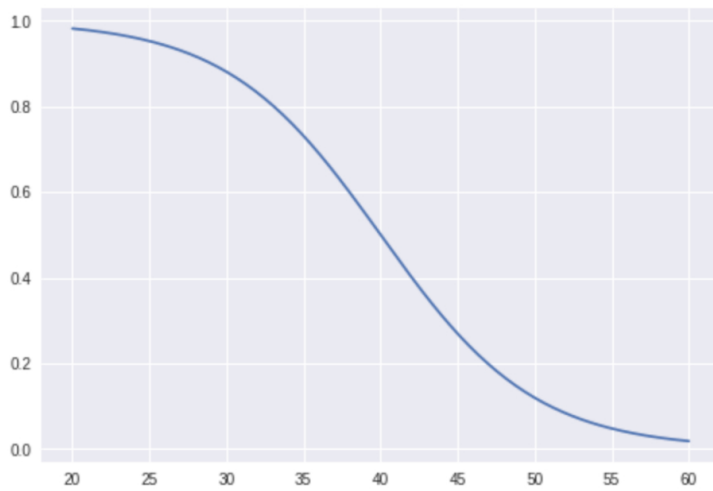




☐ Graph:



☒ Graph:



✓ Correct

3. Two probabilities have been transformed using the logit function. The two values after transformation are -2 and 0.25. Which of the two values corresponds to a higher original probability?

1 / 1 point

- ☐ -2
- ☒ 0.25
- ☐ They are the same
- ☐ Can't tell

✓ Correct

4. NHANES records whether an individual has smoked 100 cigarettes or more. The next few questions will focus on fitting models to predict whether someone has smoked 100+ cigarettes. 1 / 1 point

First, a model is fit using body mass index (BMI) as the variable to predict smoking status. The output is here:

	coef	std err	z	P> z	[0.025	0.975]
Intercept	-0.4219	0.123	-3.426	0.001	-0.663	-0.181
BMI	0.0037	0.004	0.911	0.362	-0.004	0.012

What does the coefficient of 0.0037 mean?

- ☐ For each increase by one in BMI, the probability of smoking 100 cigarettes increases by about 0.0037, on average.
- ☐ For each increase by one in BMI, the odds of smoking 100 cigarettes increases by about 0.0037, on average.
- ☒ For each increase in one in BMI, the log odds of smoking 100 cigarettes increases by about 0.0037, on average.
- ☐ For each increase in one in BMI, the odds of smoking 100 cigarettes increases multiplicatively by about 0.0037, on average.

✓ Correct

5. Next, a model is fit adding Age as an additional covariate to BMI as the variables predicting smoking status. The output is here: 1 / 1 point

	coef	std err	z	P> z	[0.025	0.975]
Intercept	-1.2435	0.149	-8.366	0.000	-1.535	-0.952
BMI	0.0030	0.004	0.718	0.472	-0.005	0.011
Age	0.0169	0.002	10.349	0.000	0.014	0.020

What does the coefficient of 0.0169 mean in context?

- ☐ For each increase of one in BMI, the odds of smoking 100 cigarettes increases by about 0.0169, on average.
- ☐ For each increase of one in Age, the odds of smoking 100 cigarettes increases by about 0.0169, on average.
- ☐ For each increase of one in Age, the log odds of smoking 100 cigarettes increases by about 0.0169, on average.
- ☒ For each increase of one in Age, the log odds of smoking 100 cigarettes increases by about 0.0169 while holding BMI constant, on average.

✓ Correct

6. Based on the logistic regression with both Age and BMI as covariates, are the coefficients statistically significant at a two-sided 10% significance level? 1 / 1 point

	coef	std err	z	P> z	[0.025	0.975]
Intercept	-1.2435	0.149	-8.366	0.000	-1.535	-0.952
BMI	0.0030	0.004	0.718	0.472	-0.005	0.011
Age	0.0169	0.002	10.349	0.000	0.014	0.020

- ☐ Both coefficients are significant
- ☐ Neither coefficient is significant
- ☐ Only the coefficient for BMI is significant
- ☒ Only the coefficient for Age is significant

✓ Correct

7. The 95% confidence interval for the coefficient for Age is given above as (0.014, 0.020). If instead we wanted a 90% confidence interval, how would the width of the interval change? 1 / 1 point

- ☐ It would be wider
- ☒ It would be narrower
- ☐ It would stay the same
- ☐ Can't tell

✓ Correct

✓ Correct

8. We'd like to predict the log odds of smoking 100+ cigarettes for a given individual using the logistic regression model with the two variables: BMI and Age. For an individual with a BMI of 22 who is 45 years old, what would the predicted log odds be?

1 / 1 point

	coef	std err	z	P> z	[0.025	0.975]
<b>Intercept</b>	-1.2435	0.149	-8.366	0.000	-1.535	-0.952
<b>BMI</b>	0.0030	0.004	0.718	0.472	-0.005	0.011
<b>Age</b>	0.0169	0.002	10.349	0.000	0.014	0.020

- ☒ -0.417
- ☐ 0.8265
- ☐ 0.327
- ☐ -0.7367
- ☐ Can't tell

✓ Correct

9. The sample of adults surveyed in NHANES contains adults age 20-80 with BMIs of 14.5-64.6. For the individual with a BMI of 22 who is 45 years old, do you trust the predicted log odds calculated above as being reasonable?

1 / 1 point

- ☐ No, this is extrapolation
- ☐ No, this is interpolation
- ☐ Yes, this is extrapolation
- ☒ Yes, this is interpolation

✓ Correct

10. Fill in the blanks. With 95% confidence, I estimate that the increase in log odds of smoking 100+ cigarettes for each increase by one in BMI, while holding Age constant, is between \_\_\_ and \_\_\_, on average.

1 / 1 point

	coef	std err	z	P> z	[0.025	0.975]
<b>Intercept</b>	-1.2435	0.149	-8.366	0.000	-1.535	-0.952
<b>BMI</b>	0.0030	0.004	0.718	0.472	-0.005	0.011
<b>Age</b>	0.0169	0.002	10.349	0.000	0.014	0.020

- ☐ -1.2435 and 0.149
- ☐ 0.014 and 0.020
- ☐ -1.535 and -0.952
- ☒ -0.005 and 0.011
- ☐ Can't tell

✓ Correct