

a)

Log-odds calculation:

$$\log_odds = -3 + (0.8 \times 2) + (1.5 \times 0) = -1.4$$

Odds:

$$odds = e^{-1.4} = 0.2466$$

Likelihood (Probability):

$$likelihood = \frac{1}{1 + e^{-(-1.4)}} = 0.197 \sim 0.2 = 20\%$$

b)

Log-odds calculation:

$$\log_odds = -3 + 0.8 \times 2 + 1.5 \times 1 = 0.1$$

Odds:

$$odds = e^{0.1} = 1.105$$

Likelihood (Probability):

$$likelihood = \frac{1}{1 + e^{-0.1}} \sim 0.525 = 52.5\%$$

c) yes. The hours studied factor directly affects the log-odds and the corresponding probability of passing. If Thomas studied more hours, his log odds and the probability of passing will increase. If Thomas studied less hours, his log odds and the likelihood of passing will decrease.

d) A student who attends the review-session will have the log-odds of passing increase by 1.5 as compared to someone who didn't attend.

e) Similarly. If a student increases their study time, their log-odds will increase. For each additional hour they study, the log odds of passing the exam will increase by 0.8.

f) The intercept represents the predicted log-odds of the outcome which is passing the exam when all predictors are set to 0. That is when $hours_studied = 0$ and $review_session = 0$, the log odds of passing the exam, i.e the intercept is -3.

g) The student's chances of passing are already very high (96.8%) after studying for 8 hours, and attending the review session increases the probability only slightly (to 99.3%). So I would suggest they attend the review_session so that they can improve their studies.

h) The students who have studied less hours will benefit from the review-session.